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JOURNAL

VOLUME 7 NUMBER 3 • MARCH, 1951

Your S.P.E.

The SPE exists primarily for the benefit of the individual member.

It is the aim of the SPE to provide each member with an opportunity to meet others in the plastics business—to learn—to participate in section meetings—to receive technical information—and to provide each member with an opportunity to make himself heard.

The biggest problem any technical society faces is to learn the wants of the individual member. The National Society serves as a collecting ground for information and an ignition point for action.

These are your responsibilities—attend meetings regularly, take an active part, transmit your ideas to the officers and to the National for consideration or action.

And these are your rewards: the satisfaction of a good job well done, the realization that you have been of service, and the secure knowledge that you have helped yourself.

If a recipe were to be written to help the individual derive maximum benefit from his membership in SPE, it might read something like this—(See page 11).

PUBLISHED BY THE SOCIETY OF PLASTICS ENGINEERS, INC.

What's New?

MACHINE

F. J. Stokes Machine Co., announces a new oscillating granulator of welded stainless steel construction. Complete details will be furnished on the Stokes 43B oscillating granulator by writing to their 5900 Tabor Road, Philadelphia 20, Pa. address.

United States Rubber Company has started to reactivate the huge Kankakee, Ill. Ordnance Works for the manufacture of high explosives. Kankakee is one of the largest in the nation and was operated by U. S. Rubber from April 1944 'til late in 1945.

They recently announced a new flame resistant Royalite thermoplastic sheet material which will not support combustion. In addition to being flame resistant, it is extremely tough, highly resistant to impact, and light in weight; easily formed into simple or compound shapes; non-corrosive and stable under changing atmospheric conditions, with exceptional electrical insulating properties and low rate of heat conductivity and water absorption; will not chip or warp, easy to clean, stainproof, greaseproof and mildewproof.

United States Rubber has purchased the Buna-N synthetic rubber plant of ESSo Standard Oil Co. in Baton Rouge, La. The plant will continue to market Buna-N Rubber under the trade name paracril.

Tumb-L-Matic, Inc., Bronx, New York has announced the appointment of Richard T. Barnes as West Coast Representative. Mr. Barnes was formerly associated with Plastics Division of Monsanto Chemical and the International Nickel Company.

The Resinous Products Division of Rohm & Haas Co., has appointed **Carl B. Bennett** to its field staff in Ohio area. Mr. Bennett was formerly associated with Catalin Corporation.

A new 60 gallon, stainless steel, heavy duty paste mixer, developed by L. O. Koven & Brother, Inc., Jersey City, N. J.

R. B. Chemical Co. of Cambridge, Mass. has developed a pre-cemented tape called Bostape which is bonded to the underside of plastic upholstery at the seams. Along with this development they announce a gadget called the "tip-top dispenser." Further information may be obtained by writing the company.

Electronic Processes Corp., 256 N. Market St., San Jose 10, California, has introduced Model 112 Ectrotherm Radio Frequency Generator for the sealing and fabrication of plastics without external heat.

Anchor Plastics Company, 533-41 Canal St., New York, N. Y. is now manufacturing a new plastic expansion shape which provides efficient and flexible joint between the glass panels on Otis escalators. When the shape is placed on the glass panel the tapered ends of the joint prevent accumulation of dirt and eliminate the possibility of the joint catching on any object brushing along the surface of the glass.

The Eriez Manufacturing Co. Erie, Pennsylvania, sole domestic and Canadian distributor for the RCA Electronic Metal Detector, announces that further mechanical and electronic improvements have been made on this equipment. This Detector is a scientifically designed automatic inspector which warns of the presence of all magnetic or nonmagnetic metals or alloys regardless of their depth in the material. This Metal Detector is now being used successfully in the food, plastics, paper, rubber, textile industries and many other fields.

Arthur T. Dalton, Secretary of Chicago Wheel & Mfg. Co., has been appointed to the Advisory Committee, Abrasive Industry of the National Production Authority in Washington.

Lupomatic Industries, Inc., will be known in the future as **Tumb-L-Matic, Inc.**, and continues to be located at 4510 Bullard Avenue, New York, 70, New York.

The World's largest ethylene unit to be built by Gulf Oil at Port Arthur, Texas. The new plant will fill an essential function owing to the rapidly mounting significance of ethylene in manufacture of defense products and expansion of the chemical industry in the Gulf Coast Region.

Chicago Wheel and Mfg. Co., announces the new powered hand tool, called "Hi-Power Grinder." The powerful motor on the "Grinder" is independently mounted and easily detached from its hand piece. Other features include an independent ball bearing spindle, lubricated for life and a forced-air ventilated hand piece. The tool measures 11" in over-all length, and weighs 5 lbs. 10 oz. Further information and literature may be obtained by writing direct to the manufacturer 1161 West Monroe St., Chicago 7, Ill.

Cumberland Engineering Co., Inc. has announced the new Cumberland Granulator for use beside each injection machine which features 6" x 10" throat opening. Further information may be received by writing the company, Dept. 4N, Box 216, Providence, R. I.

Sundstrand introduces single-paid air sander which is small and compact and is easy to handle and can be worked with equal ease over both flat or curved surfaces. Complete details are available from Sundstrand Machine Tool Co., Pneumatic Div., Rockford, Ill.

Sterling, Inc., 3738 N. Holton St., Milwaukee, Wisconsin, has added to its line of temperature control devices, the **Model 6002 Mold Temperature Control.** Designed expressely for use in the plastics industry, the **Model 6002** is a self-contained device for heating or cooling water to maintain it at a constant temperature while circulating it through passages in a mold. This Control is a dual unit consisting of two independent heating, cooling, and circulating systems in a single portable unit. It is ready and complete to operate when connected to a source of electric power, cold water and a drain.

Owens-Corning Fiberglas Corporation will construct a new plant in Anderson, South Carolina for production of military requirements for Fiberglas yarns used widely as a base for electrical insulation and many other uses.

Injection Molders Supply Company, Penton Building, Cleveland 13, Ohio announce the addition to their line of a new silicone type mold release prepared exclusively for the injection molder.

The 1951 completely revised edition of their Catalog of Replacement and Special purpose Injection machine nozzles is fully illustrated with scale drawings and photographs, and covers items of current importance like heated extension nozzles, pin point molding nozzles etc.

PUBLICATIONS

Research Appliance Company has a booklet which is available to those who wish it describing the construction, operation, and application of the Corson Cerveny **Micro- Bellows Pump.** Write Box 413, West View Road, Pittsburgh 9, Pa.

Neon Products, Inc., Lima, Ohio, has had published a booklet "History of Signs" which is available upon request.

Lasalco catalog of "Buffing and Polishing Compositions" contains valuable information on buffing and polishing plastics and metals with charts showing compositions. A copy of this new catalog will be sent if requests are made on company letterhead to Lasalco, Inc., 2840 LaSalle St., St. Louis 4, Missouri.

Rohm & Haas Co., Washington Square 5, Pa., has a new booklet **PL-35, Plexiglas, Injection Molding Powders Molding Information** which is a manual type booklet which should prove helpful to many men in the plastics field.

The 1951 edition of "New Products and Services" has just been published by the New York Journal of Commerce. Fully described and cross-indexed the 80 page compilation may be had at 50 cents per copy from the N. Y. Journal of Commerce, 63 Park Row, New York 15, New York.

New developments in alkylation, basic process in the production of high octane aviation fuel, are discussed in Kellogram No. 5 (1950) just published by the M. W. Kellogg Company, refinery and chemical engineers of Jersey City, N. J.

John Waldron Corporation, Catalog No. 125 "Plastic Processing Machinery" may be obtained from them at P. O. Box 791 New Brunswick, New Jersey address.

F. J. Stokes Machine Company has published "Fully Automatic Molding of Thermosetting Plastics" which will be sent on request by writing the F. J. Stokes Machine Company, 5900 Tabor Road, Philadelphia 20, Pa.

CHEMICAL PUBLISHING

Chemical Publishing Co., Inc. 26 Court Street, Brooklyn 2, New York announces the publication of "Organic Reagents for Organic Analysis" by the Hopkin and Williams Research Laboratory Staff. This is the second enlarged edition and now contains 224 pages.

The technique of Modern Microscopy including ultraviolet microscopy and the use of the electron microscope, is covered in a new book "Practical Microscopy" by L. C. Martin and B. K. Johnson, which has been published by the Chemical Publishing Company, Inc., 26 Court Street, Brooklyn 2, N. Y.

"Dynamic Motion and Time Study" by James J. Gillespie, is published by the Chemical Publishing Co., Inc., 26 Court Street, Brooklyn 2, New York is written for chemists, engineers, operators, and research workers in industry.

FELLOWSHIPS

Mellon Institute of Industrial Research announced the establishment of a Multiple Fellowship by the Pittsburgh Plate Glass Company that will be concerned with a comprehensive program on special fibers. Further information may be obtained from the Mellon Institute, Dr. Edward R. Weidlein, University of Pittsburgh.

Dr. Edward R. Weidlein, Director, Mellon Institute, Pittsburgh, Pa., announces that the Quaker Oats Company of Chicago, Ill. is the donor of a new fellowship that relates broadly to research on the utilization of by-products from the manufacture of furfurfal.

PATTERSON CHANGES NEW YORK OFFICES

The Patterson Foundry & Machine Company, East Liverpool, Ohio, has announced the removal of their New York district offices from the RKO Building to new and enlarged quarters in Suite 5115, Empire State Building. Both the machinery and process engineering division of the company will be located at this new address.

Italian Plastics

The Third International Salon of Plastics, Rubber. Varnishes and Glues will be held in Turin, Italy from September 30 to October 20, 1951. This annual event is a very complete and well organized show covering materials, machinery and various categories of applications.

Kenneth T. Barker is now in charge of chemical engineering and plant design for DeBell & Richardson, Inc. Other recent additions to this plastics development and engineering firm are **A. R. Backstrom** and **A. L. Gaudreau**, chemists; **T. J. Grabowski** and **H. S. Schnitzer**, chemical engineers; T. H. **Leddy**, former 3rd officer U. S. Merchant Marine and U. S. N.; and **R. I. Lent**, physicist.

Mr. Hilbert Wachtel, owner of Industrial Plastics Co., Inc., 90 Commerce Street, New Haven, Conn., passed away Tuesday, February 20, 1951.

Mr. Wachtel was associated with Plastic-Ware, Inc. as one of the principals for a period of more than 10 years.

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JOURNAL

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INDEX

ARTICLES

The Classification of Thermoplastic Resins from Their Plasticities—by W. H. Willert 7

Your SPE—by Jesse H. Day 11

Professional Activities Committee Reports
- Liquid and Unfilled Resins—by E. E. Howard 14
- Automotive—by John K. Totten 15
- Machine and Equipment—by S. K. Moxness 17
- Education—by James Church 18

FEATURES

The Injection Molderscope 13

Plastics Abroad 5

Q's and A's 4

What's New? 2

SECTION NEWS

Section News Notes 10, 22
Cleveland 19; Detroit 21; Miami Valley 21; Newark 23; New York 20; Quebec 23; South Texas 21; Upper Midwest 24; Western New England 22.

ADVERTISERS

American Hydrotherm Corp. 13

Bakelite Co., Div. of Union Carbide and Carbon Corp. 6

Barrier—Pribble and Co. 10

Durez Plastics and Chemicals, Inc. 3

Injection Molder's Supply Co. 4

Manco Products Co. 24

Miskella Infra-Red Co. 23

The Society of Plastics Engineers Journal is not responsible for the views expressed by individual contributors. Copy for each issue should be received at 409 Security Bank Bldg., Athens, Ohio, before the fifth of each month.

MODERN PROBLEMS

get modern answers with DUREZ

Control Box Assembly Simplified . . .

TV rotating antenna control case was blueprinted by manufacturer with 8 tapped transformer mounting holes. Custom molder recommended low-cost general-purpose Durez for job, and provided a more durable, more rigid mounting with *four molded-in* screw posts. Lugs, bosses, and cut-outs are likewise molded in; hydraulic cylinders are used for coring. Results: simplified assembly, and a more serviceable product.

Phenolic Tap Changer Costs Less . . .

Here is a four-piece enclosed Durez transformer tap changer that superseded an open porcelain unit. The new product is safer, looks better, costs less to produce. The plastic is less subject to breakage, and its lighter weight is a further advantage. Precision fit of parts is due to accuracy of molds designed and made by the custom molder.

THOUSANDS OF PRODUCTS, big and little, are evidence of the versatility of the Durez phenolics in lending themselves to the needs of industry. Possessing an extraordinary range of desirable properties, these plastics are produced in more than three hundred different molding compounds. Durez field technicians are available to assist you in using them profitably. Durez can help you, too, in applying resins to your processes. To keep informed on new uses of phenolics, write on your office letterhead, for our monthly "Durez Plastics News." Durez Plastics & Chemicals, Inc., 1103 Walck Rd., N. Tonawanda, N. Y.

DUREZ

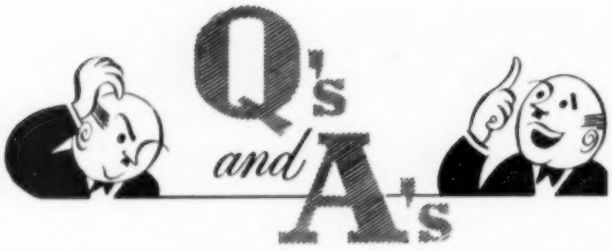
Phenolic Plastics that fit the job

PHENOLIC RESINS

MOLDING COMPOUNDS

INDUSTRIAL RESINS

PROTECTIVE COATING RESINS



If you know the answer to the query below, then you're in luck! Write Box 3-B SPE Journal, 409 Security Bank Bldg., Athens, Ohio.

Gentlemen:

We have been fabricating in connection with our complete line of metal kitchen cabinets, several sizes of corner and end what-not units.

The shelves of these units are made of glass 7/32" thick and have a split aluminum tubing for an edge binding, which is also used to attach to the steel body of the unit.

Government restrictions do not allow us to use aluminum after June 1, 1951, therefore, we must seek a substitute.

Our requirements would be as follows:
Shelf A—5,000 pcs., Shelf B—750 pcs.
Split Tubing—10,000 lin. ft.

This letter is written to obtain some indication quickly, regarding availability and prices on these items made of plastic. Further information will be furnished upon request.

POSITION OPEN

PLASTICS ENGINEER—To function as General Foreman in plant manufacturing Thermo-setting articles used in the electric appliance field. Minimum of two years experience required. State age and experience. Write to Box 16 SPE Journal.

POSITION WANTED

Technical Sales, Service and Development Position — phenolics for laminates, wood adhesives, beater-addition, molding compounds. Currently in key position as manager of technical service and chief development chemist with resin manufacturer; considerable field experience. Ten years of broad, pioneering background. Write to SPE Journal, Box 7, 409 Security Bank Bldg., Athens, Ohio.

Procedure for Handling Membership Applications

Now is a good time to review the handling of applications for membership by the Section Secretary. New section secretaries are being "swamped" by applications.

Whoever accepts an application for membership should make certain the initiation fee is attached and then turn the application over to the secretary of the section. The secretary is responsible for the application until it is sent to the National Office for processing by the National Credentials Committee.

The Section Secretary fills out the "Report of Membership Application" (a blue form) and sends it with the initiation fee to the National Office. He fills out the "Information from Reference —" form and mails it out to the references listed on the application. If he would like to speed up the processing, he can enclose a self addressed, stamped envelope with the reference form. It costs the section 41¾ cents per month per application held unprocessed.

When the references have returned the forms sent to them, the secretary then gives the application to the Section Committee for classification. The Credentials Committee classifies and signs the application after which the secretary presents it for the approval of the Section Board of Directors. As soon as they approve it, he signs it and sends it to the National Office for the approval of the National Credentials Committee. If the application is not approved it is sent back to the section for more information.

Upon receipt of the Report on Membership Application with the initiation fee, the National Office acknowledges receipt of the initiation fee to the applicant and to the section. When the application is received from the section, it is sent out to the National Credentials Committee. When they approve it, the applicant is notified of his election to membership. The section secretary is sent a notice of approval and a record card for the member.

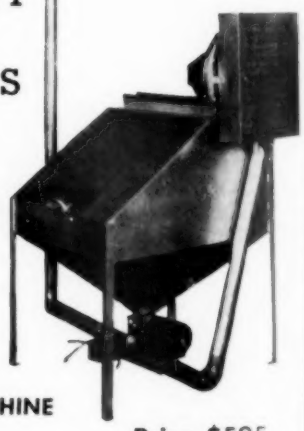
(All of this will be found in detail under "Procedure for Handling Membership Applications" on page three of the Constitution and By-Laws.)

All of the forms mentioned will be supplied by the National Office upon request.

FOR BIG INJECTION MACHINES

IMS PNEUMATIC MATERIAL LIFT for HIGH HOPPERS

SAVE:
Floor Space!
Spillage!
Labor!



400 lb. Storage Bin!
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Easy to Clean!
Compact!

IMS INJECTION MACHINE
Hopper Loader Price $595.

Send for Users List and Special Bulletin

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Penton Bldg. Cleveland 13, Ohio

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Plastics Abroad —

A LETTER FROM NORWAY

Dear Sirs:

We are writing you today, as we should be very glad to establish more contact with your organization and, if possible, have a closer cooperation between our associations for the benefit of the plastic industry in our countries. For this reason we should like to give you some information about the Norwegian plastics industry, of which you probably know little.

About two years ago Studieselskapet for Norsk Industri (Norwegian Industries Development Association), organized a kind of cooperation with and between the Norwegian plastic manufacturers. This initiative at once showed very good results and was highly appreciated by the plastics industry and has led to an independent organization, Forening for Norsk Plasticindustri, which now uses Norwegian Industries Development Association only as a secretariate.

Forening for Norsk Plasticindustri counts today about 47 members, where the majority consists of molders and fabricators, some manufacturers of raw materials and a few representatives of foreign firms, who provide this branch of industry with machines and raw materials not manufactured in our country.

The plastic industry in our country has developed very rapidly after the war, with the lifting of a lot of government restrictions for buying raw materials and machinery from abroad, and consists now of about 60 firms, while there was before the war just a handful of molders occupied with the manufacture of electrical insulation materials from phenolformaldehyde molding powder.

The raw materials situation, which was very bad in this country just after the war, has now due to great efforts changed considerably and will still develop during the next few years. There are now two firms manufacturing phenolformaldehyde molding powders, both from imported phenol, but one with its own production of formaldehyde. Both these firms are also producing urea and melamin resins for glues, and the biggest of them is pretty soon going to be in production with urea molding powders, this due to the production of urea which has been started in these days by one of our biggest chemical plants. In the thermosetting field we have also a firm, which manufactures casein plastics, but has not yet a capacity to cover the Norwegian market. Another very interesting development in the thermosetting and protein field is a new firm manufacturing molding material from fish waste. This production which has been on a more experimental stage for the last two years, is now in full scale, and the material has aroused very big interest here in Norway as well as in several other countries, which promises a very good future for this material.

The situation on the thermoplastic field has been worse, but is now changing rapidly, as a firm has been started, which is now in production for manufacture of polyvinylchloride plastics and is going to have a capacity bigger than the consumption in Norway. The biggest Norwegian cellulose manufacturer is building a plant for the production of cellulosic plastics, and will probably be on the market in another two or three years.

Further, there is in this country a firm which makes decorative laminates as well as laminates for electric purposes. Another firm is producing acrylic sheets from acrylic scrap, which is imported, and still another firm is in production with plasticizers as dioctyl phthalate and dibutyl phthalate. Further, there are a couple of firms occupied with the production of coated materials paper base as well as fibre base. The same firms produce film and sheets generally from PVC.

The rest of the firms are molders and fabricators, some occupied with injection molding, some with extrusion and some with compression molding, but a lot of them are working with both thermosetting and thermoplastics materials at the same time. Generally speaking, the equipment used is modern, as they have not been in production so many years, but the lack of foreign currency has certainly had a big influence on the development of these firms, as they have had difficulties in getting import licenses for new machines as well as raw materials. Among other difficulties of the Norwegian plastics industry is certainly the fact that the country is small (3 million inhabitants), so the production series cannot be very big, and therefore the expenses for molds are very heavy.

The annual consumption of raw materials is approximately as follows:

Phenol formaldehyde molding powder	540	tons
Urea molding powder	475	"
Melamin molding powder	120	"
Polystyrene	425	"
Cellulose acetate	329	"
Polyethylene	123	"
Nylon	17	"
Acrylics (sheets)	149	"
Casein	12	"
Polyvinyl chloride	768	"
Other vinyl compounds	39	"
Other elastomeres	265	"

We hope, Gentlemen, that this short summary will give you some idea of the situation on the plastic field in Norway, and we should, as earlier stated, be very glad to cooperate closer with your organization by exchanging news of interest to members of our organizations in the plastics field as well as helping each other with the distribution of enquiries of both commercial and technical or scientific character.

We are looking forward to a successful cooperation and shall be glad to hear from you.

Yours faithfully
FORENING FOR NORSK
PLASTICINDUSTRI
A. Dobrowen.

AND ENGLAND

The full range of British plastics, products of all of the leading British manufacturers in this field, will be featured at the 1951 British Industries Fair, according to the American Committee for the BIF.

To be staged in London and Birmingham, England, from April 30 to May 11, this huge annual trade show will embrace more than 1,000,000 square feet of exhibits — with the plastics section to be located at London's huge Earls Court exhibition hall, in a leading place as one of the featured trades for 1951.

Outstanding will be exhibits of fabrications and extrusions of many types; casein; new insulating materials; cellulose acetate powders for injection molding; new non-inflammable, cushioning materials for packaging and other industrial uses; "high style" plastic jewelry; plastic toys and utensils; special emulsions for use in paints; corrosion preventive compounds for iron and steel; p.v.c. polished sheets with cloth support for the shoe industry; new embossed p.v.c. sheeting for use in handbags and other personal accessories, and many others.

The BIF is, in effect, a huge showcase where virtually the whole range of British industry—some 100 industries—displays its goods, conveniently arranged in groups of trades closely allied to buyers interests. At Olympia and at Earls Court in London, two of the largest exhibition halls in the world, half a million square feet of space will be devoted to the light industries. Castle Bromwich in Birmingham, which is 12 times larger than the arena of New York's Madison Square Garden, will house miles of heavy industry displays. These will range from agricultural equipment to mighty industrial machinery, marine equipment, electronic devices, and hundreds of other products.

Know Your Plastics

IT MAY MEAN BETTER AND FASTER PRODUCTION...AT LOWER COST

BAKELITE thermosetting Polyester Resins are combinations of styrene monomer and complex polyesters developed for contact pressure and low pressure molding, laminating, and casting. Polymerization is brought about by the use of catalysts, application of heat, or both. The resins are supplied as pale liquids in varying viscosities. They are produced in several grades, principal among which are detailed below.

This message deals with "BAKELITE" POLYESTER RESINS

"BAKELITE" QRS-81 GENERAL PURPOSE

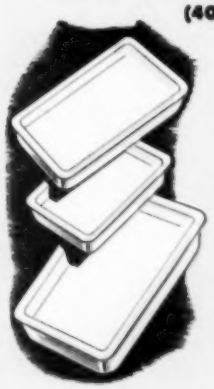
This general-purpose, liquid resin was developed for structural applications. It is particularly serviceable for matched-die molding because of its excellent moldability and easy flowing quality. Also readily formed with plaster, wood, and sheet-metal molds. Applicable to rubber-bag molding. Cures at room or elevated temperatures with standard catalysts. Does not precure. Retains excellent mechanical strength and electrical values at operating temperatures under 150 deg. F.

"BAKELITE" QRS-136 FLEXIBLE

This is a flexible resin sold as a non-plasticized liquid. It can be used alone for certain applications requiring a high order of toughness and flexibility, as in the production of tubing. However, it has been most useful to date as a modifier for other Polyester Resins to impart toughness and impact resistance in structural laminates and moldings. Compatible with most other Polyester Resins. Recommended for mechanical applications or where electrical insulating requirements are not critical.

"BAKELITE" QRS-17560 HIGH VISCOSITY

(4000-6000 cst.)

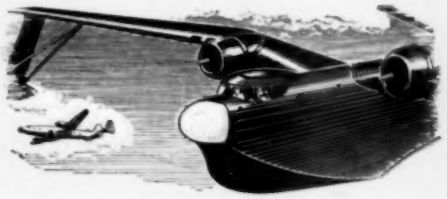


Formulated for producing castings or moldings with fewer inherent stresses and strains than with other grades of Polyester Resins. Provides non-crazing pieces of high resin content, with or without filler. Where fillers are called for, smaller quantities are required. Because of versatility of this resin it is particularly satisfactory for the production of castings made from glass-fiber preforms.

"BAKELITE" QRS-140 MEDIUM VISCOSITY

(300-600 cst.)

This is a medium viscosity resin developed especially to meet the insulating requirements for high-frequency electronic apparatus and components (9375 megacycles per second). In electrical properties it approaches BRS-16631, so widely used in World War II for radomes and other vital equipment. It is easier to handle than BRS-16631 because of improved moldability.



The development of BAKELITE Polyester Resins for molding reinforced plastics is a continuing operation of the Bakelite Laboratories. Formulations can be varied almost infinitely, and tailored to your particular jobs. Some of these jobs . . . chiefly with glass fiber cloth or mat . . . include boat hulls, radomes, refrigerator panels, housings, luggage, to which they give light weight, high impact, tensile, and flexural strength, and resistance to moisture, many chemicals, and heat. Superior electrical insulation values are attainable. For instance, laminates made with these resins have relatively low power factors throughout the 60 to 10^6 cycles range. They eliminate the need for costly molds, high heat, and high pressures. Engineers and designers interested in BAKELITE Polyester Resins are urged to outline their needs *in fullest detail* for a thorough, confidential analysis. Write Dept. BV 45

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SPE 1950 Prize Paper Contest—$100 Prize

CLASSIFICATION OF THEMOPLASTIC RESINS BY THEIR PLASTICITIES

By W. H. WILLERT
Hartig Engine and Machine Co.
Hillside, New Jersey

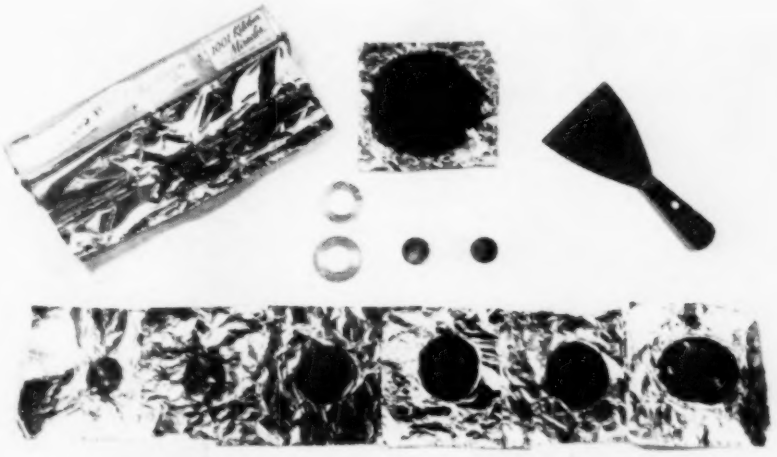
A simple, rapid test gives the flow characteristics and plasticity of thermoplastics. The information is useful in setting up machine cycles and conditions.

Thermoplastics have been classified as to their chemical, physical, mechanical and electrical properties (1). Comparisons between the various commercially available resins as to their tensile strength, specific gravity, solvent resistance, dielectric characteristics, natural color, moisture resistance and so on, can be found in a number of handbooks. Thermally they are classified as to yield temperature, softening point, and melting temperature. Some resins as the cellulosics are compared on their A. S. T. M. flow temperatures. Although handbooks list their injection and extrusion temperatures, it is almost always necessary to make a series of runs by the trial and error method to determine the proper temperatures or conditions at which the plastic should be processed. The available information does not indicate what happens or how the polymers behave over a full temperature range starting with normal room temperatures to those well above their melting point. A search of available literature showed that several studies (6) have been made and methods proposed (9) to measure the viscosities of molten thermoplastics. Since these data are not readily available from the raw material suppliers on all those commercially marketed, it is assumed that each processor would have to make his own determination.

The purpose of this study is to show how the plasticity curve for a resin can be simply determined by a laboratory method and indicate how the results may be utilized by the processor. The method described can be installed in a plant for about $350.00 and used by any non trained person. The scope of this paper will be limited to the classification of a few common commercial resins used in the injection, extrusion and other processing fields.

Definition of Terms: Plasticity is defined by Webster as the plastic quality or state and the ability to retain a shape attained by pressure deformation. For this work it will be referred to as the softness or proneness to flow. A "high" plasticity will refer to the condition of a plastic that offers less resistance to flow in contrast with low plasticity that is difficult to work. A "Plasticity Curve" of a resin will refer to the plasticity plotted as a function of temperature at a constant pressure. Plasticity is measured in square inches (of area); temperature in degrees Fahrenheit and pressure in pounds per square inch. The following will describe the method used to obtain the plasticity curve.

Description of Test: For test samples a basic unit of one cubic centimeter was used. This unit was selected because all plastics are thus compared on the same volume, and the specific gravity does not become a factor. In most processing operations, the common basis is volume rather than weight. "Buttons" of 1.128 inches in diameter equivalent to one square inch in area and .061 inches in thickness (making the volume equal to one cubic centimeter) were molded in a Carver press from each sample to be tested. Usually ten discs from each is sufficient for one curve (the average weight in grams per disc is a rough check on the average specific gravity). Each resin was handled as in preparation of a plastic for processing; acetates, butyrates and methyrates dried; vinyls compounded if not a finished compound; nylons carefully taken from their vacuum sealed containers; etc. The discs were "compression" molded as follows; in a mold consisting of a washer to the above tolerance, resin was put in the recess; and the whole assembly placed between aluminum foils. Between the platens the resin was preheated thirty seconds and then pressed for thirty seconds at 10,000 psi. The lowest possible temperature needed for a good disc was used. The piece was taken from the press, the foil stripped off the sides and the flash carefully removed. To determine the plasticity at a given temperature, the disc is sandwiched between aluminum



The photograph shows the "tools" used; aluminum foil, forms used for molding the test specimens, and scraper to insert or remove the plaques from between the platens. Top center of same photograph shows the molding compounding; center, test specimens; and lower row, resulting vinyl plaques from pressing at 2500 psi at temperatures of 260, 280, 300, 320, 340, and 360°F.

foils about 5½" square and placed between the platens of a Carver Laboratory press. The platens are closed and the sample is allowed to preheat for a predetermined length of time. After preheating, the pressure was increased to a predetermined amount and held constant for another definite time interval. The pressure was then released and the sample removed. After cooling rapidly the foil was stripped and the area of the resulting plaque was measured. The area was measured by tracing the outline of the plaque on co-ordinate paper and counting the squares. Other methods as using a planimeter, weighing templates cut from heavy paper, estimating from circles of known area, etc. can be likewise used with good results.

For this study, the thickness tolerance on the discs was held to a +.002"; the preheating time to one minute; the time under pressure, one minute; the hydrostatic pressure, 2000 psi on a 1¼" ram, the area of the plaque measured in square inches; and the temperature recorded in Fahrenheit degrees. A study on the effect of preheating as a bearing on the plasticity results was made on polyethylene resin (P.E. has one of the lowest heat conductivities of the plastics used) and it showed that at least 45 seconds was needed before results were not affected. One minute was used to insure consistent results. Likewise one minute was shown to be the most effective length of time for the pressure to be applied. Shorter times introduced errors due to the time required to raise the pressure and release it (approximately 5 seconds) and a longer period resulted in decomposition of the sample at the higher temperatures. It was felt that two minutes would be the average to maximum time the resin would be in an extruder or molding machine. Hydraulic pressure of 2500 psi was used on the press. It brought out the effects desired and is thought to be about the average to minimum obtained in an extruder.

The plasticity of the various resins was determined on the basis of keeping the pressure constant and varying the temperature. The resulting plasticity measurements were plotted as a function of the temperature to give the plasticity curve for the resin. By determining the plasticity at 20° F intervals from room temperatures to well above their melting points, some very interesting results were obtained.

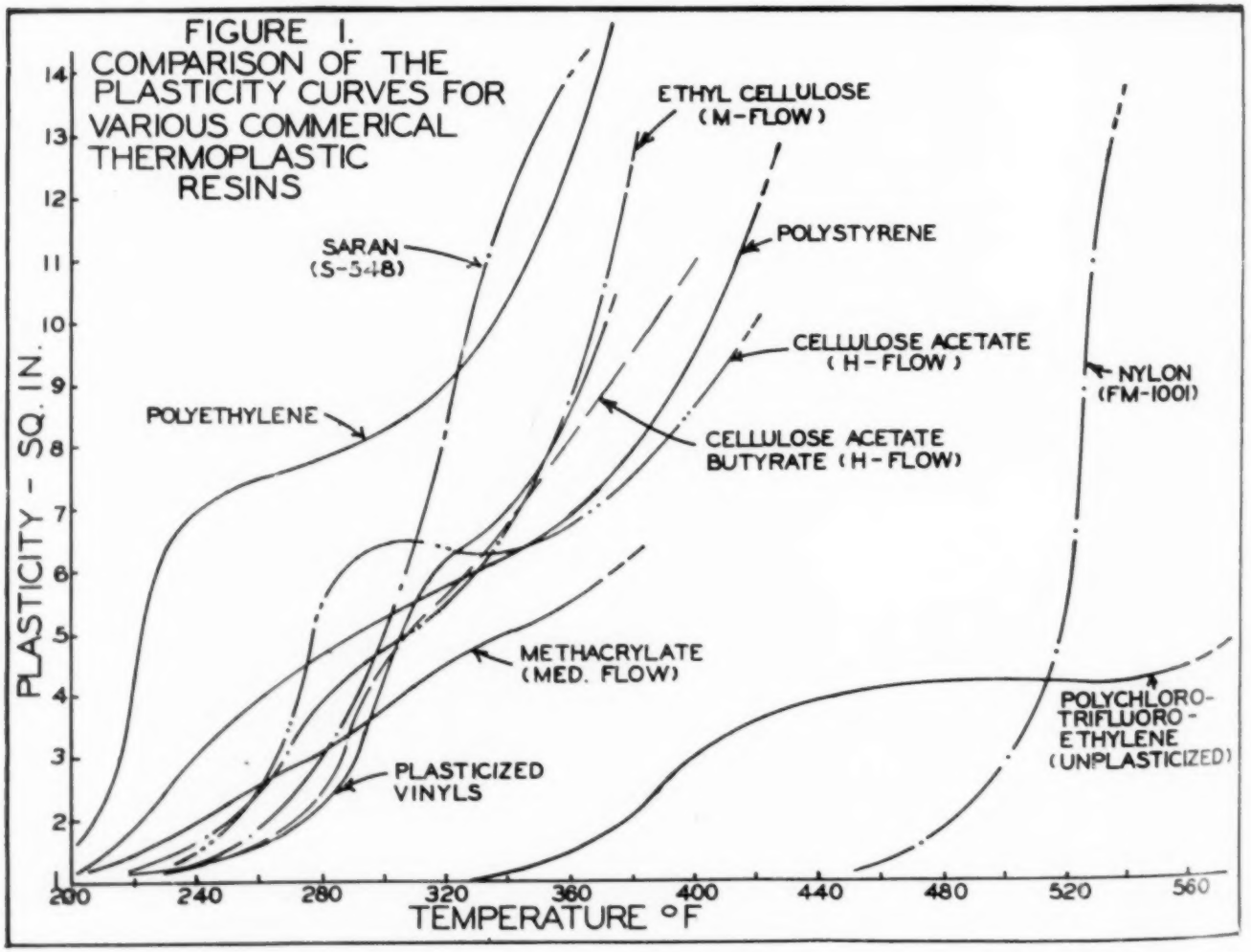
Data

Plasticity curves for the following resins were obtained by the methods and conditions described above.

Cellulose Acetate, H-Flow
Cellulose Acetate Butyrate, H-Flow
Ethyl Cellulose, (approx.) M-Flow
Methyl Methacrylate, Med. Flow
Nylon, Rigid FM-10001
Polyethylene, 20,000-21,000 molecular wt.
Polychlorotrifluoroethylene, Kel - F 270
Polyvinyl chloride, plasticized 80 durometer hardness
Saran, S-548 type B-115

The above ten commercially available resins are believed to be representative of the most commonly used in the injection and extrusion fields. The results proved to be most interesting when plotted on a common graph and compared as shown in Figure (1).

Interpretation of Data: Immediately upon comparing plasticity curves of the various resins shown in Figure (1), the similarity between Saran, S-548 and nylon FM-10001 can be seen. Both have very sharp melting points and rapidly transform to a state with a very high plasticity in comparison with the others, although



their melting points are some 280°F apart.

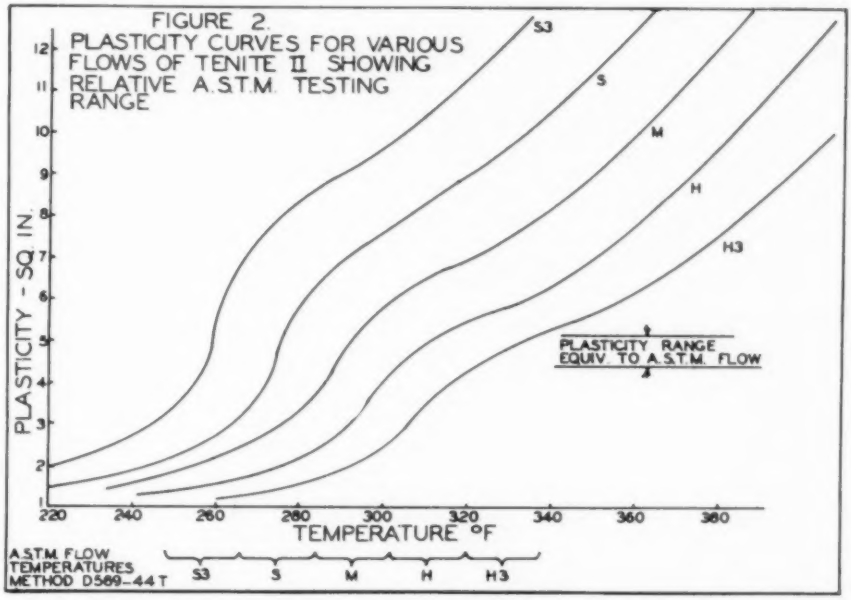
Polychlorotrifluoroethylene has the lowest plasticity of those tested. It has a very indefinite and broad softening point range. From this point (about 440°F) to its melting point of about 550°F, the curve is almost flat which indicates a temperature increase has very little effect upon its flow or plasticity. As the temperature is increased above 560°F the plasticity is increased slightly, but this is partially due to slight decomposition of the resin for the standard length of exposure.

For the grade or type of polystyrene and methyl methacrylate used, these resins have the same general type curve. Both show signs of having slight softening point ranges but for all practical purposes from the beginning of flow to the beginning of decomposition, the plasticity varies uniformly with temperature. Styrene has a wider working range than the methacrylate; the upper end being limited by discoloration. When the methacrylate reaches 365°F, it starts to depolymerize, resulting in monomer bubbles. Polystyrene also begins to break down into styrene monomer at about 390°F in the two minute exposure. With shorter intervals it is possible to raise the temperature to about 500°F. However discoloration will occur if air or moisture is not eliminated from the system.

The curves for the cellulosics show the effects of modifying the basic cellulose structure with aceto, butyl and ethyl groups which internally plasticize the polymer in comparison with common organic plasticizers as the ethyl, butyl, and the like, sebicates and pthalates. Acetates seem to be a physical mixture of the flake and plasticizer up through the softening point range. For the H-Flow shown, the plastic begins to soften at 240°F and increases rapidly as the temperature reaches 300°F. As the temperature increases, the flow decreases slightly, which appears to be due to complete compatibility between the two components. This effect was more pronounced in the hard flows and minimized in the softer flows where the percentage of plasticizer is greater. When preparing the test specimen it was noticed that the transparent samples were much clearer at this point, which tends to bear this theory out. Plasticity increases uniformly from 340°F until about 390°F, when plasticizer bubbles begin to appear.

The modification of the cellulosic structure to produce an ethycellulose molding compound of about an M-Flow, minimizes the softening point effect that the acetate compound showed. This effect was only slightly apparent in the cellulose acetate butyrate compound. The plasticity of both these compounds increased fairly uniformly with temperature rise and both are limited by vaporization of the plasticizer.

To determine how the plasticity data obtained by this method correlates with the various A. S. T. M. temperatures and classifications, the curves for several flows of Eastman's Tenite II, cellulose acetate butyrate, were obtained. Figure II shows the plasticity of the S3, S, M, H, and H3 flows plotted against temperature (°F) on which the A. S. T. M. (method D-569-44T) range for each has been indicated. Comparisons indicate that the A. S. T. M. flow temperatures could be taken as the temperature required to produce a plasticity in the range from 4.4 to 5.1 square inches. If more determinations were made it may be possible to narrow the range.



The flow of vinyls can be varied to a great extent, depending upon how they are compounded. The choice, type and percentage of plasticizer along with the amount of fillers used has the largest bearing on the flow; solvent type plasticizers have the largest effect, extenders only moderate, and the polymer type, like buna-N rubbers, the least. Also most vinyl resins are copolymer and the resins themselves vary too much to show the complete effects here. This study has been limited to one common compound. The plasticity curve of the vinyl compound shown in Figure (1) is for a general purpose extrusion grade with a shore durometer hardness of 80 and is commonly used for garden hose, tubing, belting, etc. It begins to soften about 240°F and is in a thoroughly fused state at 300°F. The curve indicates that the working temperatures can be extended up to about 360°F or to the point where decomposition and plasticizer vaporization are imminent. Although the plasticity curve does not increase with temperature as uniformly as styrene, they are no indications that there are any critical changes or reverse in flow between 280°F and 350°F like that found in the acetate sample.

Polyethylene has a very large sweeping curve covering a wide temperature range. This is primarily due to the fact that it is a linear polymer with a fairly high molecular weight, contains no plasticizer to volatilize and has excellent heat stability. The resin softens and the flow increases rapidly between 220 and 250°F. Between 320 and 350°F there is another sharp break in plasticity correlating with its so-called melting point. From this temperature on up, the plasticity increases rapidly and the resin becomes so fluid it is impossible to measure it by this method. (The temperature of polyethylene can be raised to at least 500°F in an inert atmosphere without appreciably breaking it down). This resin exhibits and covers the complete range of temperature and plasticity that all the other plastics put together do.

Conclusions:

It is evident from the above results that the characteristics or behavior of the flow of a compound over its entire workable processing range cannot be judged from any segment or portion of its plasticity curve. Only when different flows of the same compound are used, can segments be compared and then they might be in error as there can be two similar sections with identical flows as evident with the cellulose acetate plastics. It is felt that by expanding this test and comparing the curves with the conditions used to process the various compounds, a scientific approach to the problems of the molding and extrusion industry would be made. Once an operator knows how to run one compound effectively, with this information available he should be able to swing from one to another with the

least amount of effort and trial and error runs.

In addition to the above problem, such data may lead to a better understanding of a number of controversial points in the design and operation of injection and extrusion machines. In the extrusion field, the engineers are concerned with the "proper" land length, screen pack, die design, extrusion rate, screw design, temperature of the screw, cylinder, and die, and the removal of frictional heat. It is certainly evident from the plasticity curve for polyethylene shown in figure (1) that more and finer screens, along with a shorter die land could be used when extruding film, which uses plastic temperatures starting with 320°F (and up) than when producing plastic pipe from the same resin at a much lower temperature range. Likewise, in the wire covering field, one would not expect to be able to use the same sizing die for both polyethylene and vinyl compounds although many attempt it, resulting in lower production rates or rough finishes.

In the injection molding field, there are controversial points concerning proper cylinder temperatures and cycle speeds, molding pressures, mold design with respect to runner length and size, gating, and mold temperatures. "Pin point gating," a recent development would appear to be very effective in creating frictional heat as the material enters the cavity to keep the plastic temperature up to assure filling the mold and prevent laminations when used on styrene, acetates, methacrylates, and other compounds with low plasticity and be less effective with nylon and saran. With plasticity data available on a comparative basis, it should be possible to approach the problem scientifically providing the plastic temperature is known and is controlled.

The scope of this test could be expanded to other fields as press polishing, lamination, form molding, and compounding. Further usefulness would be to study or compare cold flow, heat stability, softening and melting points, and the effects of preheating, pressure and temperature on flow between the various resins. It can be used for production control between batches or lots used in the plant.

Summary: This study is not meant to be the answer to the problems found in the plastic field, but rather to show that classification of our various commercial resins is not adequate for processing purposes. The industry as a whole has not settled on one or a series of testing methods that can be applied effectively to all thermoplastics. This is characteristic of an industry such as ours which is still in its relative infancy and expanding at a rate never experienced by any other. Some correlation and better standards are sure to develop.

The proposed test as described would have to be modified slightly to obtain the best results for all concerned. Carrying out the test in an enclosed system or in an inert atmosphere would be beneficial. The use of an accumulator for constant pressure, and automatic temperature controls would reduce errors and speed it up. No doubt manufacturers of laboratory testing equipment would work these details out efficiently.

Acknowledgements: The writer wants to take this opportunity to thank the raw material suppliers for their help and cooperation in supplying the samples. The aid received from the Fred S. Carver, Inc., and others who let me use their laboratory equipment is appreciated. The help and encouragement from my employer, The Hartig Engine and Machine Company has made it possible for the entry of this paper in S.P.E. 1950 National Prize Paper Contest.

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Section Notes

A joint technical and dinner meeting of the **Philadelphia Section** of SPE and S.P.I. was held on February 27th at the Franklin Institute to hear Harry Connor of Stokes Molded Products Co. discuss large piece molding.

The **Buffalo Section** visited the Hewitt Robbins plant at 240 Kensington Avenue on February 16 following the dinner at the Park Lane Restaurant. Committee chairmen were announced for the year as follows: Professional Activities — Paul Bronnenkant and Elmer Howard; Credentials —Allen Sim; Finance—Eugene Roeck; Program — J. Clarke Cassidy, Jr.; House—Bill Glass; Publicity and SPE JOURNAL reporter—Ralph Rushmer; Historical—Chick Larkin; Educational —George Goepfert.

"Plastics Merchandising Possibilities under the Rearmament Program" was one of the topics at the February 14th meeting of the joint Chicago S.P.E.-S.P.I. Sections.

MOLD DESIGNS
LARGE MOLDS, SMALL MOLDS OR IN-BETWEEN
PRODUCT DESIGN
FOR BEST USE OF PLASTICS
CONSULTATION
"A Consulting Engineer is a Good Investment" (Chem. Eng.—Aug., 1950)
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Let US Be

YOUR extra hand

YOUR SPE—

The SPE is yours here is how it works.

By Jesse H. Day
Ohio University
Athens, Ohio

The SPE is a democracy run by you. What the SPE offers is an opportunity for you to help yourself—and others. Here's a blueprint.

THE SPE AND YOU

The SPE has no ax to grind. It is a society of individuals banded together for mutual benefit. Just how **much** benefit a member derives from his membership depends largely on how active the member is. Nothing miraculous happens to a member on joining—there is no mystic transformation of the individual into an economic royalist. But something **has** happened—the benefits in terms of increased knowledge and friendships are of lasting duration.

More than one foreign correspondent has written that such groups as SPE are difficult or impossible to establish because, they write, "We are a group of receivers—not givers"—in the sense that technical know-how is hoarded, secreted, so that information exchange between competitors is unknown. It is precisely because information exchange is relatively free that SPE meetings are important.

If a recipe were written to help the individual derive maximum benefit from his SPE membership, it might read something like this:

ATTEND MEETINGS REGULARLY! The speakers are authorities, and remember that even if his topic is not in your own field, still you must have knowledge of the **whole** field for complete understanding of any part of the business.

ATTEND MEETINGS REGULARLY! And make an earnest effort to meet and talk with **every** other member. You can't do this in one night, or even in one year, but extending your circle of friends pays rich dividends in satisfaction—and sometimes in money or advancement.

TAKE AN ACTIVE PART! Tell your program chairman and the officers what topics you would like to hear discussed. Tell them when you enjoy a meeting—tell them and you guarantee their best efforts to make meetings even better. If it happens you don't like a meeting, tell them, but especially tell them **why**. In this service alone, you can do a great deal to make your section meetings affairs that are looked forward to eagerly.

TAKE AN ACTIVE PART! Do not refuse committee work out of modesty. Here especially you can render important service—service to the men who belong to your group, service to the SPE, and service to yourself.

TAKE A REALLY ACTIVE PART! Seek out problems or activities that your section or the national can undertake to advance the plastics business. If you recognize the need for a special test procedure, a special compilation of information, or have ideas on educating the public or rendering a public service, then let your local officers know, and let your national officers know.

These are your responsibilities as a member of SPE; attend meetings regularly, take an active part, transmit your ideas to the officers and to the national office for consideration or action.

Fulfill your responsibilities and these are your rewards: the satisfaction of a good job well done, which is one of the greatest satisfactions a man can know; the realization that you have been of service; and the secure knowledge that you have helped yourself.

PROBLEMS OF THE SPE

The biggest problem any technical society faces is to learn the wants of the individual member. The National Society serves as a collecting ground for information and an ignition point for action. Remember that the SPE has no separate identity — it is **you**, and two thousand more individuals, just like you.

The SPE exists primarily for the benefit of the individual member. It is not a company sponsored organization, but is an organization of individuals who make their livings in the plastics business.

It is the aim of the SPE to provide each member with an opportunity to meet and become acquainted with other men in the same business, which gives the member a chance to learn of parts of the business with which he has no contact, to improve his knowledge of his own field, and—not least—to make friends; to learn technical information through the medium of the talks given at section meetings; to receive technical information and news of the activities of the local sections, and of the activities of the national committees through the publication, the SPE JOURNAL; and an opportunity to advance the cause of plastics locally and nationally by taking part in the committee activities.

THE SPE SECTIONS

Each SPE Section has its own board of directors, officers, and a group of committees. The committees may be working as a part of a national committee, or may be working independently, or may deal with problems of purely local interest. Most sections meet ten times a year.

The Section meetings provide the members a chance to gather together—to swap news of the industry, to discuss common problems, to learn, to make new friends, and to plan and carry out those activities, such as are mentioned below, chosen as worthwhile.

A few examples of local activities will illustrate: a bibliography of publications on laminates has been compiled, printed and distributed to the members by the Detroit group; an effective idea for getting members acquainted was introduced by several sections; the Detroit Section yearly counsels and advises college students on the opportunities in plastics; Cleveland for two years gave a course at the John Huntington Institute, with SPE members as lecturers; St. Louis has provided courses for department store personnel, to help buyers, clerks, and indirectly the whole public; Toledo has provided exhibits for the public; Cleveland sponsors Junior membership from Case Institute of Technology, and many, many more examples could be cited.

NATIONAL SPE

The better you know how the SPE functions, the better you can help the Society serve you. The SPE has two goals; to aid the individual up-grade himself, and to advance the cause of plastics in every way possible.

For the clearest understanding of the workings of SPE, and of your part in SPE, it is necessary first to outline our scheme of organization.

THE NATIONAL COUNCIL

Each local section of SPE elects a National Councilor for a term of three years. The National Council is made up of this group of men, who elect the national officers from their membership. These national officers, president, vice-president, secretary and treasurer serve for one year.

It is the duty of the national coun-

cil to determine the policies, attitudes and actions of the national SPE; what the SPE is to do and how it is to be done.

The National Councilor for each section is important—it is his duty to tell the National what his section wants or needs, and what it is doing. It is his duty to keep his local section informed of what the National is doing, why they are doing it, and how the local section can participate. The degree of mutual effort and cooperation between the National Society and the local section is determined largely by the National Councilor, your elected representative.

THE NATIONAL COMMITTEES

The National Society seeks to promote the plastics arts on a wider scale than is feasible for a single section to undertake. The need for a specific committee is usually recognized by the National Council, and a committee chairman appointed by the National President. The chairman then selects his committee from the membership of the SPE, and often includes interested men from outside the membership. He may then further set up similar committees to work on specific aspects of the task at hand in one or more local sections.

The Education Committee, currently headed by Dr. James M. Church of Columbia University, has been working for some years to determine the kind of education which will best fit a man as a plastics engineer, and to set up college curriculum requirements to implement that goal. They have earnestly solicited the opinions of industry, the experiences of successful men, and contributed knowledge from first-hand sources. The Committee has contributed outstandingly to making clear what academic preparation is essential, and to defining the kind and quality of courses needed for that preparation. Such information is needed by men who wish to enter the field of plastics, by schools and colleges who wish to make such training available, and by industry as a yard-stick to measure the background of potential employees.

The Professional Activities Committee is in charge of work dealing with properties and applications of plastics materials, and has under it sub-committees on Automotive, Business Machines, Chemical Investigation, Coatings, Color Standardization, Communications, Government, Household Appliances, Laminates, Machinery and Equipment, Low Pressure, Molding Technique-Thermo-setting, Molding Technique-Thermo-plastic, Mold Design, Refrigeration, Quality Control, Radio, Tool Design, and Packaging.

The National Professional Activities Committee's duty is to seek out problems of interest to the plastics engineers, to define such problems, appoint men to gather data of the kind needed, to inform and enlist the aid of the local committees and finally to publish results. Some of the completed achievements of this group includes the SPE 100 M, test for determination of volatile contents of laminating materials, and SPE 101 M, test for determination of flow properties of laminating materials, as published in November, 1945; the compilation of a bibliography of books and articles on the laminating art, published in the May, 1949 SPE JOURNAL.

THE NATIONAL OFFICERS

The National President calls the meetings of the National Council, arranges the agenda, presides over the meetings, appoints committees and serves as the SPE representative in dealings with other groups.

The Vice-President fulfills the functions of the presidency in the absence of the president.

The Secretary keeps the minutes of the council meetings.

The Treasurer is responsible for the annual audit of the books.

The Executive Secretary is in charge of the National Office, now located at 409 Security Bank Building, Athens, Ohio, and is the only paid officer of the Society. The first Executive Secretary on full tenure was William B. Hoey who served for the year 1946. Since then the office has been capably filled by Bess Day. The work of the Executive Secretary includes numerous duties, but especially he provides the continuity that could not be maintained if all the officers were subject to yearly change.

The National Office is charged with the responsibility of coordinating the efforts of the SPE, the work of committees, the compilation of procedures for national activities, such as the annual conference. Not the least of such duties include answering the many letters from members, committees, officers, business firms and other societies; much correspondence originates from such foreign countries as England, Italy, Denmark, Mexico, Canada, India, Japan, and South America. The various records and archives of the Society are kept at the National Office, as are the business records.

The National Office serves as a service bureau for printing, mimeographing, letter-writing, and publicity material for the national SPE, the national committees and whatever local sections or committees avail themselves of the national office's facilities.

The mailing of the SPE JOURNAL, committee reports and publicity, as well as the billing for dues, are done through the national office. Legal details, contracts and the like are handled by the Executive Secretary.

Because of the small size of the staff at the National Office, compared to the amount of work required, it has not been possible for the Executive Secretary to travel much to section meetings. However, in 1950 Bess Day attended meetings of the Central Ohio, Newark and New York Sections to speak on the operations of the National Office.

THE PUBLICATIONS COMMITTEE

The work of the Publications Committee is to publish and disseminate news of national activities, committee reports, news of local meetings and items of personal interest, and to seek and publish articles of technical interest to members of SPE. Much of this work is carried on in the monthly publication, the SPE JOURNAL, received by every member of SPE.

Special publication duties are the printing of the Constitution and special committee reports which are designed for publicity purposes.

Certain special things about the SPE JOURNAL should be noted. First, the Journal is the face and the voice of the SPE. It is our only contact with interested non-members, other societies and those seeking information about SPE. The Journal goes to many public, institutional and business libraries here and abroad.

One of the services of the Journal is the printing of all the talks presented at the Annual Technical Conference. It publishes also a yearly roster of the membership, as well as regular items about local sections and committee reports. Other features include a Question and Answer Column, and a regular column 'The Injection Molderscope' of special interest to injection molders, as well as advertisements of positions open and positions wanted.

Technical articles printed in the Journal are screened by an active editorial advisory board which includes such well-known authorities as J. H. DuBois, Wayne Pribble, Carl Frosch, and Mario Petretti. News of section activities and personal items are sent in by section publicity committeemen.

SPECIAL NATIONAL ACTIVITIES

The Technical Conference

The National Technical Conference and Annual Meeting is held each January, and features a program of technical papers presented by eminent authorities, and symposium discussions on topics of timely interest. A large portion of the cost of the meeting is borne by company registration fees, and a listing of company representatives present is posted for the guidance of attending members.

The National Council convenes concurrently for the election of new offi-

(Continued on page 24)

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THE *Injection* MOLDERSCOPE

BY A. R. MORSE
Injection Molder's Supply Co.

Injection machine parts are getting harder to obtain—but deliveries on machines a little easier. Design progress prevents standardization.

Injection Machinery:

Injection machinery manufacturers are all cutting back production, especially on big injection machines. They are of course scared of (and feeling) the impact of the material shortage as it affects the injection molder. And it is almost impossible to get together the timers, tubing, wiring, fittings, pumps, motors, valves, heater bands, and all the other purchased components that make up modern injection molding machines. Is rising prices of components still another factor in this cutback? A rough calculation shows purchased parts are well over $^1/_3$ of the cost of an injection machine. (The other $^2/_3$rds are about equally divided between steel, castings, and machining and assembly ($^1/_3$); and overhead, service costs and profit ($^1/_3$). It takes a DO number right now to see most of the component parts of an injection machine. And except for a few—very few—vital repair parts, DO numbers are scarce as hen's teeth in the injection industry. I wonder if injection machines haven't been priced right out of the range in which the average injection molder can afford to buy and use them as production tools?

Some pretty canny boys run the major injection machine houses. The minute there is any "official" letup of the material shortage, and an easing of the component parts situation they will be in there with increased production. But right now the thinking is all toward cutting back—to zero production of injection machines if necessary, before they are stopped either officially or by economic factors (eg—fear of getting a machine 9 10 built and then tying up big investments because they can't get a few essential parts.)

However, deliveries on injection machines which have been running deep into the second and third quarters are now easier. Some molders are glad to accept postponements, and a phone call to the right person at the machinery company will get you a machine much quicker than the salesman would lead you to believe. But there are not too many cancellations, as injection molders know that priorities will NOT be forthcoming for additional machines in event of full scale war, and they are taking machines for which they have no immediate molding powder. So in spite of dwindling machine production the delivery situation is somewhat easier; and to date no "official" government statements have been made on injection machinery.

The Sixteen Ounce HPM:

Injection molders have known that the 16 oz. HPM was not too popular in the trade. But today the same machine ties with the Watson-Stillman for first place—if it does not hold it. How come? The HPM people actually overcame the inertia which characterizes most injection machine makers. For years HPM used an inefficient plate type cooler—and cool oil is a must with the HPM. The new 16 oz. has a Ross cooler of ample capacity and the molder does not have to add another cooler to keep the machine running. The machine has been quieted down and speeded up. Most important, it features one of the longest heaters ever made by HPM. From what progressive molders say, I would rate this machine tops in its class. Credit George Kelly of Columbus Plastics Products for most of the good ideas found on this successful machine.

SPE Panel of Experts on Injection Machinery:

Don't think that a report on the SPE's panel of experts who discussed injection molding machines at the January SPE Annual Technical Conference won't be forthcoming—BUT—I want to think it all over a little and see what the professional writers in the trade papers say first. None of the "experts" committed themselves to any great extent, but I will still try to tell the injection molder what — if anything — resulted from Islyn Thomas' spirited efforts to bring the mountain to Mohammed.

You don't get much real cooperative spirit among the injection machine makers. They are good fellows and bend a convivial elbow together, but clam up when you talk specifications —and you can't blame them. Only the injection molder who has several makes of injection machines in his plant knows which injection maker is telling more stories than the next one —and even he won't give out with this vital data as it is admitting a pretty serious mistake on his own part by buying an overrated but underperforming injection machine. SO — **caveat emptor** still prevails in the injection machine industry. And the fellow who stood up and asked the injection machinery people to take the wraps off their engineering details will only get the horse laugh instead. Competitive factors prevent — and rightly so — standardization of injection machine specifications. No new injection machine entrepreneur has a right to request free engineering data gathered at considerable expense by other manufacturers, and which is after all their stock in trade, since so few factors in injection machine design can be calculated along conventional engineering lines.

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Report of the

PROFESSIONAL ACTIVITIES COMMITTEE

George A. Peck, *Chairman*
Standard Cable Co.

Subcommittee on Standardization and Test Procedures for Liquid and Unfilled Powdered Resins.

Elmer E. Howard, *Chairman*
Carborundum Co.

I. Inclined Glass Plate Flow Test

1. SUBJECT: **INCLINED GLASS PLATE FLOW TEST**

2. **PURPOSE AND UTILITY**
   a. This is a method for measuring the relative fluidity of heat-reactive resins under specified conditions of temperature, time, and gravitational pull. Essentially the test involves measurement of the extent of flow, down an inclined glass plane, of a preheated pellet of resin, of specified size and weight, at a specified temperature in a specified time.
   b. The test is applied, as a routine quality control test, to certain pulverized resins.

3. **APPARATUS**
   a. The following apparatus and equipment are requisite for the correct performance of the test:
      (1) "Constant temperature" electric oven.
         (a) The oven should be thermostatically controlled to maintain an average temperature of 125° plus or minus 1°C., within the oven chamber, with deviation of less than 1°C from the average at any point within the chamber.
         (b) The oven should be modified by permanent installation within the chamber, of an externally operated plate support rack, to permit tilting of test plates thereon from a strictly horizontal position to a dip of 65° from the horizontal without opening the oven door and the oven chamber inside dimensions should be ample to permit such tilting of the plate rack without interference by bottom or ceiling of the chamber. The plate shall rest on a 3/16" transite panel.
      (2) Thermometer for oven—engraved stem, range 0 to 200°C. in 1°C. divisions, approximately 24 inches long, with lower ungraduated portion 12 inches long. (Fisher Scientific Co. Catalog 90, Item 13-280, or equivalent.
      (3) **Smooth** glass plate, 4"x6" x 3/32", the test plate.
      (4) Analytical balance (with Class S weights), sensitive to 0.001 gram.
      (5) Pellet mold—a 3-part steel mold, consisting of an approximately cubical block (chase), perforated by a cylindrical hole of 0.500 inch diameter; a force to fit said hole; and a bottom plug to be inserted in said hole. The length of the force and bottom plug should be such that when the latter is in position, and the force is inserted to its maximum depth, an unoccupied space, 6 mm. long, remains between plug and force, the force being provided with a stop to restrict its entry.
      (6) Brass hammer.
      (7) Knockout for pellet mold —metal rod, 15/32" in diameter, mounted perpendicular to a steel base. The rod should be of the same height as the pellet mold.
      (8) Stop watch, range at least 30 minutes, in 1/5 second divisions.
      (9) Steel ruler—graduated in millimeters.

4. **SAMPLE PREPARATION**
   a. Apply the test to pulverized resin as submitted to the laboratory.
   b. If, however the resin is unground, grind same to pass, in entirety, through a U. S. Standard Sieve No. 200 (75 microns opening).

5. **TEST CONDITIONS**
   a. The test should be run at a temperature of 125°C. plus or minus 1°C.
   (b) Heat the oven to the desired temperature and adjust the thermostat to maintain constancy of temperature. Adjust the thermometer immersion so that the bulb of the thermometer is in close proximity to the panel rack, but does not interfere with movement of the latter.

6. **PROCEDURE**
   a. Weigh out 0.500 gram of pulverized resin on the analytical balance.
   b. Place the pellet mold upon a metal surface (the knockout base) with the bottom plug inserted.
   c. Add a sufficient amount of the weighed out resin to the mold cavity to completely fill it. By means of the metal force and the brass hammer, tamp the material down lightly, just enough to permit addition of the remainder of the 0.500 gram sample. Repeat tamping until force has been inserted to its maximum depth and the pellet height is 6.0 mm.
   d. Remove the force and push the pellet up, vertically, by placing the bottom of the bottom plug upon the top of the knockout and pressing down.
   e. Carefully slide the pellet onto the glass plate to a point near the shorter edge. (Several pellets may be lined up on one plate.)
      (1) Prepare only one pellet from each resin sample, if a "control" is run in parallel.
   f. As a "control" prepare a pellet from a "standard" resin, the flow of which has been determined previously. Place the "standard" pellet on the same glass plate along with the sample pellets.
   g. Place the glass plate with pellets on the panel rack, in horizontal position and so placed with reference to the axis of the rack that the resin will flow "the long way" of the glass plate when tilted.
   h. Immediately close the oven door and heat the glass plate (and pellets) in the horizontal position for exactly 3 minutes.
   i. At the expiration of 3 minute prewarming period, tilt the rack to a position 65° from horizontal, by means of external mechanism for so doing, and continue the heating for exactly 20 minutes (additional to 3 minutes prewarm).
   j. At the expiration of the latter period, immediately remove the

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plate and allow same to cool in a horizontal position.

j. When the glass plate and pellets have cooled to room temperature, measure the total length of the pellets (including the pellet original diameter), to the nearest millimeter, by means of the rule applied to the underside of the glass plate.

(1) Report the total lengths of flow as the "flow" of the material.

k. If the flow of the control sample deviates by more than one millimeter (plus or minus) from the accepted flow value thereof (the arithmetic mean of previous tests), repeat the test upon control and all samples represented on the particular glass plate.

7. **REPORT**

a. Include in the report:

(1) Material number.
(2) Batch number.
(3) Flow, in mm. of sample material.
(a) Flow, in mm., of control sample, in parallel.
(4) Operator identification.
(5) Date of test.

8. **NOTE**

a. The above procedure presumes that a 0.500 gram charge of pulverized phenolic resin will be sufficient, when tamped down moderately, to form a pellet which is 6 mm. high. For "heavier" resins, however, an adjustment in weight of charge will be necessary. In such cases, the weight of pellet should be shown in report.

Subcommittee on Automotive

John K. Totten, Ford Motors Co.
Chairman

I. Performance Specifications—Films Supported and Unsupported

SCOPE: This specification covers films, supported and unsupported, suitable for upholstery, head linings, door panels, and other applications for interior and exterior use.

GENERAL REQUIREMENTS:

1. Light Stability.
After 300 hours exposure in an Atlas Fadeometer or S-1 Sun Lamp, there shall not be evidences of fading, degradation, softening, tackiness, or checking in excess of that agreed to by purchaser and vendor. After cooling to room temperature, there shall be no cracking when the exposed specimen is bent around a 1/8" mandrel, coated side out.

2. Abrasion Resistance.
After 1000 cycles on a Taber Abrader using CS-17 wheels and a 500 gram load, the tested specimen shall compare favorably with the master sample held by the purchaser as pertains to weight loss and surface damage.

3. Volatile Loss.
After 3 hours exposure in a dry oven at 174-178°F., there shall be no more than 5% loss in weight and no more than slight change in flexibility as agreed on by vendor and purchased.

4. Brittleness Test.
After one hour exposure to temperatures of -20 to -30°F. immediately bend test specimen around a 1/8" mandrel, coated side out. The coating shall not crack or loosen from the fabric, the later pertaining to supported film. If unsupported film, the film shall not crack.

5. Blocking Test.
A specimen of film, supported or unsupported, measuring 2"x4" doubled over, coated side in, and placed between 2 glass plates on which a 1 pound weight is applied. The assembly is placed in a dry oven at a temperature of 174-178°F. for 1 hour. After the 1 hour exposure period, the tested unit is removed from the oven and allowed to cool to room temperature. The specimen is removed from between the glass plates and unfolded. As a result of this test there shall be no evidences of exudation, adhesion or degradation of the surface.

6. Tensile Strength.
A. Films to be used for upholstery of seat cushions 145 psi—minimum
B. Films to be used for head linings and inner door panels 45 psi—minimum

7. Mullen Burst Test.
As specified by the purchaser.

8. Weight per unit area.
As specified by the purchaser.

9. Outdoor Exposure.
After 8 months exposure in Florida there shall be no change greater than that permitted as indicated by exposed master sample.

10. Contact and Migration Staining.
Evidences of staining, tackiness, migration, or degradation of the mating surfaces after exposure to the staining test and or migration test, shall not exceed that agreed upon by vendor and purchaser.

A. Contact Stain.
Expose in contact with the surface the application will be contacted to for a period of 48 hours at 158—162°F. Specimens of the film shall be placed back to back, coated side out and inserted between 2 panels, the organic finished surfaces of which are in contact with the film. A 1 pound weight is set on the test unit. The unit is set into the oven at required temperature and for the stated period.

B. Migration Stain.
Specimen of the film is placed coated side down on the organic finished surface of the panel. The test assembly to be exposed to ultra violet light (Fadeometer or S-1 Lamp) for 48 hours. The ultra-violet source and placement of the test specimen shall be as described in ASTM Designation D925-47T.

11. The plastics materials from which the films are formed shall be identified by popular chemical name.

12. Films shall compare favorably with the master sample as pertains to color, pattern, etc.

13. General appearance of the film shall compare favorably with established trade standards for films.

Subcommittee on Automotive

II. Performance Specifications protective Insulation — Low Tension Cable

SCOPE: This specification covers plastic materials used as protective insulation for low-tension wire applications in automobiles.

GENERAL REQUIREMENTS:

1. The material shall be homogeneous in composition, adhere closely to the conductor, but be readily stripped for the purpose of making connections. The insulation shall not leave any film on the conducting surface that will require cleaning before soldering.

2. Heat Test.
The insulation shall not lose

form up to 240°F. It shall be capable of operation at continued temperatures at 180°F.

3. Cracking.
   The insulation shall not crack when bent around a mandrel of the approximate outside diameter of the insulation after exposure to an ambient temperature of 180°F for a period of 240 hours.
4. Contraction.
   After exposure to 180°F. ambient temperature for 125 hours, not more than 1% linear contraction is permitted.
5. Flexibility.
   Insulation shall remain flexible at low temperature, at least -20°F.
6. Oil Immersion. After immersion in SAE 20 Motor Oil at 200°F. for 24 hours, there shall not be more than 5% shrinkage.
7. Dielectric Strength.
   In the "as received" condition, the dielectric strength, short-time test, shall be at least 300 volts per mil.
8. Chemical Resistance.
   Where usage dictates, insulation shall be sufficiently unaffected by acids, alkalies, and organic compounds as not to impair the performance requirements of the cable.
9. Outdoor Exposure.
   Where insulation is to be exposed to weather, it shall not, after 1 year exposure in Florida, crack, check, degrade, or sustain any change not permitted in the tolerance specified, in any case the electrical insulation shall not be impaired.
10. In general insulation shall compare favorably with trade standards for the industry.

Subcommittee on Automotive

III Pebbled-Surfaced Plastic Reflectors

SCOPE: This specification covers plastic reflectors with a pebbled-surface treatment on the exposed side and a metallic deposit on the reverse side protected by a suitable moisture barrier enamel or lacquer.

GENERAL REQUIREMENTS:

1. The pebbled surface shall be of spherical segments in the range of 0.020 inches diameter.
2. All surfaces of the part shall be highly polished unless designated otherwise on the part drawing.
3. The molded parts shall be free from blemishes such as orange-peel, shrink marks, weld marks, crazing, foreign bodies, and other defects which will detract from the efficiency of operation of the part.
4. Color of bright metallic coatings on the parts shall correspond to description on the part drawing and compare favorably with master samples approved by the customer.
5. Metallic coatings may be applied by the vacuum vaporization method, the cathode sputtering method, or the chemical reduction deposition method.
6. Each molded part shall be of such size and shape as specified on the part drawing.
7. All parts shall be finished off smoothly; flash, gates, etc., removed.
8. The plastics materials from which these parts are shall be identified by popular chemical name.
9. Parts shall be required to pass all the performance tests listed and described in the section — Parts Test Specification.

PARTS TEST SPECIFICATION:

I. All parts to be tested shall be attached in the normal manner to the assembly of which they are a component. This assembly shall be the unit to be cycled through indicated stability tests.

II. Stability Requirements
   A. The parts covered by this specification shall meet the following stability requirements.
      1. Accelerated Aging Test
      2. Hot and Cold Test
      3. High Humidity Test
      4. Colorfastness To Light
      5. Outdoor Exposure
   B. One—each of the 5 required parts for testing shall be subjected to each test listed above; a sixth being held as an "as received" part for comparison.
   C. During or as a result of any of these tests, parts shall not warp, crack, craze, check, or sustain a dimensional change outside the tolerances specified on the part drawing.
   D. Bright metal surfaces shall show no indications of oxidizing, peeling, blistering, tarnishing, or other discoloration.
   E. Painted surfaces shall show no indications of checking, peeling or chalking, or more than slight fading.
   F. In general parts shall not sustain any change more than that permitted by the customer apparent in the master sample retained for comparison.

III. Light Reflection
   The bright metal surfaces shall reflect not less than 40% of the measured intensity of any light source.

TEST PROCEDURES:

I. Stability Requirements
   The stability requirements listed in this specification shall be determined by the following methods:
   A. Accelerated Aging Test
      Test consists of 6 cycles—each cycle composed of 4 phases in the sequence that follows.
      1. 8 hours exposure to 100% Relative Humidity, at 100°F.
      2. 8 hours exposure to -25°F.
      3. 8 hours exposure to dry circulating heat at 150 to 160°F. Relative humidity not to exceed 40%.
   B. Hot and Cold Test
      Test consists of 6 cycles—each cycle of 2 phases in the listed sequence.
      1. 8 hours at -25°F.
      2. 8 hours in dry, circulating oven at 150-160°F.
   C. High Humidity Test
      Continuous exposure for 500 hours in an atmosphere of 100% R.H. at 100°F.
   D. Colorfastness To Light
      200 hours continuous exposure exclusive of time required for lamp or carbon changes.
      1. ASTM D620 method—S-1 Sun lamp, or
      2. Atlas Fadeometer
   E. Outdoor Exposure
      In Florida and Arizona or equivalent. Continuous exposure for one calendar year. Parts shall be placed in a position of 45° angle above a surface finished in dull black. The nearest point of the part to the black surface shall be one-half inch. Parts shall face toward the south.

II. Light Reflection
   A beam of light of known intensity shall be directed at a given area of any portion of the bright metal surface. The amount of reflected light shall be measured by means of a photolectric cell in combination with a milliammeter. Any alternate method of measuring this property may be used if it compares favorably with the method described.

Subcommittee on Machine and Equipment

S. K. Moxness, *Chairman*

Minneapolis Honeywell Register Co.
Minneapolis, Minnesota

The open discussion of common problems will be of benefit to the whole industry.

The members of the committee consist of men actively engaged in the plastic industry—the representation between custom molders and industrial molders is evenly divided.

The main objective of the committee would be to have responsible men in the plastic industry periodically meet and exchange ideas as well as keep each other posted on what is being done in the field of plastics. These discussions would not be on equipment only, but also on new or improved processes which of course again go hand in hand with equipment. I believe that most companies today are willing to exchange their ideas with competitors as well as the industry as a whole when it comes to all types of plastic processes. The industry is moving so rapidly that no one company can keep abreast of all new developments.

We believe that a group of men like this committee could do a great deal to prevent duplicate efforts being performed on many developments. By working closely together we feel that we may realize many short cuts. To limit this group to equipment only would be rather pointless at the present rate of developments in the plastic field. At Minneapolis-Honeywell we can visualize plastics in many applications where each one may require many months of experimental work, but we also know that, if successfully accomplished, great savings would materialize.

Taking our own company as an example, we have many projects waiting to be tried for practicability and we also have quite a number of projects in process. We are, among other things, looking at plastics and rubber molding as a means of facilitating quick assembly of small intricate parts. At the present time a combination zinc die casting and plastic is already in production on several applications. In this case we are assembling by die casting zinc around plastic materials like nylon, teflon, and Kel-F. Here we are obtaining a far superior product at a considerably lower cost. In another instance we are transfer molding silicon rubber into aluminum casting using the casting proper for the mold and mounting a series of intricate inserts into position with the flexible rubber. At the same time as we are mounting the inserts we are also shooting a rubber seal or gasket into position to omit using an expensive silicon O-ring. On this particular application we are saving approximately $2.50 to $3.00 per unit by this process besides improving the performance. These are only a couple of the many applications we can see here for this type of assembly.

Coming back to equipment here we believe that we probably will combine unlike materials by shooting into cavities successively by index type molding. We are at the moment seriously considering adapting a macine to permit us to die cast zinc and injection mold nylon and Kel-F into the same cavities by this index method of molding. We are considering the same type of adaptation using rubber and other materials. Applications like these in our type of work are numerous.

The above examples may seem somewhat fantastic to many, but we think it is going to be quite typical of what to expect before very long. With the appearance of the new and faster curing thermosetting materials of which we already have several in operation, the speed of equipment is going to be essential. As some of these materials are low pressure and some high pressure types, flexibility of equipment is very important. Some of these materials may require no preforming or preheating. Others may probably be preheated in the shape of sausage and fed directly under transfer rams where the charge may be cut off as desired.

The new developments in thermoplastics with heavy equipment and preplasticizers make this type of plastic more interesting than ever. Another material not to be overlooked, of course, is the polyester type which is gradually forging ahead.

We feel that the most important step for the industry today is to develop equipment flexible enough to be able to handle the requirements demanded of the future materials. We feel another important thing is to make the industry conscious of the importance of plastic laboratories specializing in the new plastic manufacturing processes and research on this type of work. We are constantly running into problems in plastics that cannot be solved without much experimental work. The plastic industry has too many unknown factors to overcome, and even with the best of cooperation between various plants it is going to be difficult to use plastic materials in many industrial applications until more facts are available.

I think we all agree on one thing. Before we can say a certain thing can be accomplished it must be tried, and before it can be tried equipment and money must be available. To sell managements of large and small industrial plants on plastic research on equipment and processses has proved a very difficult task.

I would like to suggest that each member of the committee express his personal opinions regarding equipment as he can see it is required in the near future, and bring along notes on this to permit us to have a discussion at the Chicago meeting. This equipment may be preformers, preheaters, compression or transfer presses, injection presses, controls, etc., with which one is fully familiar. We know we are not all familiar with the same phase of plastics, but I believe a large enough number of us have problems in common.

Another thing which I believe would be very helpful for this committee would be to discuss everyday problems. As an example, at the moment we have a very important problem in nylon molding. A nylon casting, after running fine at one of our sub-contractors for more than one year, all of a sudden shows up with twice the shrinkage it used to have. Cycles have been varied up and down the scale all the way in all different directions without any successful explanations. If this is a nylon raw material problem, this to Minneapolis-Honeywell is extremely serious as we are going into a very heavy nylon program.

Another very important answer we are looking for is how to omit weld lines or flow lines on metallic plexene, styrene, and methyl-methacrylate covers for thermostats. Unfortunately cored holes are required in this instance and after trying all types of gating, pin point type included, we have not accomplished satisfactory results. At the moment we are considering going to hot and cold cycle on the injection press to try to improve this. To us, any information on this is very desirable.

I am fully positive that every other manufacturing concern has similar problems like those we have and I think a committee like this could act as a clearing house for all of us. I have discussed this with several other industrial companies and they are more interested in this end of it than anything else. I think by letting our hair down on our problems and leaving ourselves open to constructive criticism there is nothing to lose and everything to gain.

EDUCATION COMMITTEE

James Church, *Chairman*
Columbia University

Plans include setting up standard curricula for plastics engineers; symposia at local sections, and introduction of fundamental discussions at the Annual Conference.

Following the revision of Article X of the Constitution last year, covering the functions and composition of the Education Committee, the committee was reorganized on a rotational basis of three year appointments with four of the members to be appointed each year for continuity of the committee's work. Eight of the former committee were reappointed, and six new members added, to provide the representation desired from both industry and college, as well as from the various fields of engineering and phases of plastics applications. At the first of two meetings of the committee held this past year, your present Chairman was elected for a three year term, and Mr. Bryce Maxwell was elected Secretary of the committee. Professor Louis F. Rahm, the previous Chairman, was asked to retain his membership on the committee in an advisory capacity as the Past Chairman.

The Educational Committee met at Columbia University during the past year on May 18 and on December 1, 1950, for discussions of several subjects related to the technical education of the plastics engineer. The following constitute an abstract of these deliberations with several recommendations to be presented to the Council for your approva'.

1. A detailed industrial and academic survey was considered. This was intended to disclose the desired requirements for plastics engineers for various technical positions in the plastics industry with a view toward improving or extending the present SPE Educational Program. It was the opinion of the committee that such a survey by mail would prove impractical and the results would not be likely to justify the expense and effort expended.

2. Promotion of the SPE Education Program by means of forum type meetings with the local sections of the Society was decided upon as the best method for: 1) publicizing the program among members of the Society, 2) determining the type of training desired by industry for plastics engineers, and 3) establishing the opportunities for engineering students in the plastics industry. It was felt that the first step in this promotion should be with the Society in order to perfect a program which would find wide acceptance among our members before attempting to interest others such as industrial executives, technical educators, or prospective students, in the SPE Education Program.

3. The first of these forum type programs on the subject of "The Training of the Plastics Engineer" was held under the sponsorship of two members of the Education Committee as part of the program of the Twin City section in Minneapolis in November, 1950. The meeting was reported as being most successful in promoting a lively discussion of various educational problems by both industrial and academic representatives. Much information was obtained concerning the ideal background for plastics engineers, feasibility of work study programs, and part time employment of student engineers by the industry on a cooperative basis.

4. Plans have been formulated for future educational forum type programs with other local section groups during the coming year. Tentative arrangements are in progress for meetings with the Hartford-Springfield, Newark, and Philadelphia sections. The committee is soliciting the support of the various local section officers, through the Council, for the organization of this type of meeting which should prove of considerable interest to the members of the Society. The objectives of such a panel discussion of the subject would be; first, to find out industry's desires in the type of basic training the plastics engineer should have for a successful career in this profession, and, second, to match this with the types of work demanded of plastics engineers in technical positions within the industry.

5. The Education Committee has recognized for some time the desirability of encouraging the presentation of papers covering fundamental researches in plastics as a part of the Society's national meeting programs, and as one of the broader objectives of plastics education. We therefore recommend that a separate Technical Symposium Committee be organized to solicit from industrial and academic laboratories papers of outstanding merit on fundamental plastics studies to be presented in a symposium at the national meetings of the Society. In the organization and arrangements for such a symposium, it might be desirable to schedule this concurrently with another program for the less technical members of the Society. Not only would the holding of a technical symposium of this type bring prestige to the Society for enlistment of membership from the technical groups, and aid in the future education of its members in recent advances in the principles of plastics technology, but it would furnish highly acceptable papers for publication in the SPE Journal.

6. As a part of the encouragement of plastics education, the committee is planning to contact the various educational institutions now offering courses in plastic technology to obtain information of a survey type to determine the type of plastics education being offered. Futher, the committee will attempt to interest the better of these institutions in expanding their present curriculum to include more courses in plastics for fulfillment of the requirements of our SPE Plastics Education Committee Program as to recommended courses. The results of such a survey, with futher improvement in the opportunities for plastics education, would enable those institutions of sufficient standing to be recognized by the Society for recommendation to parties interested in plastics education. Such a recognition would be helpful in the acceptance of those institutions for accrediting by the proper authorities. It would further help to stimulate interest among our colleges and universities for a more adequate program of education for future plastics engineers.

7. The compilation of a selected list of reference books and periodicals for adoption as minimum library requirements for the plastics engineer has been under consideration. An all inclusive list of references and plastics and related subjects would be too great an undertaking, and furthermore, recommendation of parts of this list, with the exclusion of the rest, would not be desirable from Society viewpoint. Instead, your committee recommends, for the present at least, that the lists which appear in the Plastics Encyclopedia be suggested to any interested parties asking for such information, but without any specific recommendation which might involve the misunderstanding of an endorsement by the Society.

8. Extension of the committee's activities in other levels or types of plastics education of a sub-professional level or specialized type has been discouraged for the time being. At present the committee believes that its full energies are occupied by active consideration of matters pertaining only to the professional level of plastics education until this has become fully established.

The Society is fortunate to have the unselfish interests of a group of academic and industrial men who have given freely of their time and effort in the work of this committee during the

past year. Special mention is made of those members of the committee who are retiring this year, following many years of service to the Society; namely, Professor Fulton Holtby of the University of Minnesota; Professor Ralph K. Witt of The John Hopkins University, and Mr. D. M. Gray of Stoner-Mudge, Inc., Pittsburgh, Pa. Some recognition is due these men, through an expression of appreciation from the Society, for their services in the work of this committee.

In conclusion, we trust that the progress of your Education Committee during the past year, in the development and promotion of a program of plastics education for the plastics engineer, meets with the approval of the National Council of the Society. It is our hope that we may have the wholehearted support and endorsement of the Council for a continuation of the plans of the committee as outlined in this report.

Respectfully submitted,
James M. Church
Chairman, S.P.E. Education Committee

Columbia University, N. Y.
January 12, 1951

Chairman:

Professor James M. Church (Ch. E.)
Department of Chemical Engineering
Columbia University, New York, N. Y.
(Term expires Jan. 1, 1953)

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Mr. H. W. Rose (Textiles)
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(Term expires Jan. 1, 1952)

Dr. Norman A. Skow (Laminites)
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Mr. Robert C. Bartlett (Coatings)
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Past Chairman:

Professor Louis F. Rahm (M.E.)
Plastics Laboratory
Princeton University, Princeton, N. J.
(Term expires Jan. 1, 1953)

MILITARY DEMANDS FOR PLASTICS DISCUSSED AT CLEVELAND

By WAYNE ANDERSON

Present and proposed military uses for plastics were reviewed at the first 1951 meeting of the Cleveland-Akron Section of The Society of Plastics Engineers on January 29 by Charles N. Gardner, Associate Research Director, Military Planning Division, Office of the Quartermaster General.

Serviceability requirements of the military are such, according to Gardner, that many thermoplastics such as polystyrene and cellulose acetate are unsuitable, being too soft at elevated temperatures and extremely brittle at low temperatures. Plastic items of this type are not "soldier-proof." He cited the instance of polystyrene spoons softening after being immersed in a canteen cup over an open fire; although not intended for such use, no control of field usage can be exercised.

Gardner said that applications for polyethylene have expanded so rapidly that even before military procurement program began, this material was in short-supply. "It is reported that production of polyethylene will be expanded and the material in supply in the next year, but until all military requirements are considered it is doubtful that all of these requirements can be made," he added.

Wayne Anderson

Although vinyl resin and vinyl film capacity is adequate, according to the QM research director, the problem here again is one of tailoring products to military specifications.

"Our uses of vinyl film are now limited to such items as rifle and gun covers, personal effects, bags, and we are experimenting with a vinyl film burial pouch," Gardner said. "We have considered film raincoats and rainsuits, along with other similar items, but for one reason or another they have failed to meet functional requirements," he added.

Vinyl compounds will continue to be used for coatings on fabrics in increasing volume. Vinyl coated nylon ponchos and vinyl coated duck for portable shelters are two examples.

The greatest field of interest to military agencies now, according to Gardner, is reinforced plastics—polyester glass film laminates. Other materials, however, may and are being used in applications requiring a reinforced plastic such as nylon, Fortisan, Orlon and Fibre V. "These laminates offer us a practical solution to problems of high and low temperature serviceability, toughness, durability, and a good strength-weight ratio. Products made from these materials are being considered by us and other agencies and include arctic sleds, skis, field cases and desks, footlockers, boats, landing mats, housings,

(Continued on page 24)

STATIC ELIMINATION BY ALPHA-RAYS; AND POST-MOLD TREATMENT AT NEW YORK

By A. M. MERRILL

Two interesting talks featured the first regular meeting of the New York Section on February 21, the January meeting having been cancelled to avoid conflict with the national conference. Approximately 40 members and guests of the group attended the meeting which was held at the Hotel Shelburne, and included a cocktail hour and dinner.

Speakers at the technical session were Rolland Jenkins, Reco Sales Co., who discussed "Static Elimination with Alpha Rays," and Robert D. Sackett, Monsanto Chemical Co., whose topic was "Improvement of Thermoplastic Products by Post-Molding Treatment." Mr. Sackett substituted for S. R. Melvin who had been scheduled to speak but was unable to attend.

Using slides to illustrate his talk, Mr. Jenkins discussed the use of polonium for temporary dissipation of static charges in the processing of plastics. Unlike other radio-active materials which also emit beta and gamma rays, polonium is a pure emitter of alpha particles only. These alpha particles ionize the surrounding air, and the ionized air then neutralizes any static charges in the plastic material.

Alphatron static eliminators sold by Reco are manufactured by Canadian Radium & Uranium Corp. in two forms, bar type and blow gun type. The bar type consists of a metal strip or form which is partially plated with polonium, the ends being left uncoated for handling and installation. A thin gold coating is electroplated over the polonium to protect it and personnel handling the bar. This bar type static eliminator is particularly suitable for film and sheet processing operations. For molded plastics, Alphatron blow guns can be used to eliminate static charges prior to finishing operation. These guns have a polonium foil liner inside the barrel, and emit a blast of ionized air which neutralizes static charges.

Mr. Sackett stressed the importance of post-molding treatments which are relatively inexpensive for greatly increasing the saleability and utility of many plastic articles, with consequent substantial increase in profits for the molder. Using slides as illustrations, the speaker discussed different types of post-molding treatments, including decoration, assembly, metallizing, annealing, and destaticizing.

Decoration is the most popular of these treatments, and includes lacquering, silk screening, printing, gold stamping, rubber stamping, application of decalcomanias, and the like. At a small additional cost, decoration yields items with greatly increased eye appeal, saleability, visual contrast, and flexibiiity (items of different appearance from the same original moldings).

Since many items cannot be molded in one piece, the use of assembly techniques greatly magnifies the field of plastics application, Mr. Sackett said. Included in this category are cementing, and the integration of parts by means of heat, friction, or other physical force. Metallizing enables the plastics manufacturer to coat his product either entirely or in part with a thin film of metal, and thus provide physical and chemical protection as well as hide any defects in color or appearance. In addition, the process gives parts that combine the light weight and low cost of plastics with the luster and surface hardness of metals. These metal films can be applied by means of electroplating, vacuum metallizing, or cathode sputtering.

Annealing provides a simple and inexpensive means of strengthening parts, particularly those with thick sections or varying thicknesses, by relieving internal strains or stresses set up by rapid molding cycles or by the peculiarities of the part design. Annealing may be accomplished in either an air or hot water bath at a temperature about 5° F. below the heat distortion point of the plastic. Destaticizing may be accomplished by treating the plastic article with a material to form a conductive film that drains the static charge away. Both temporary and permanent types of destaticizing treatments are available.

In the business session preceding the talks, Section president George Baron, Ideal Plastics Corp., announced that Arthur L. GeWertz, manufacturers' representative, has taken over the duties of secretary-treasurer for the year, and that Mr. GeWertz and Richard Stott, Stott Tool & Machine Co., have been elected to the board of directors to fill two vacancies left by resignations. The board of directors is now as follows: one year — Messrs. Baron and Stott, Bruno Wessinger, Wess Plastic Molds, Inc., and Sam Silberkraus, Riverdale Laboratory; two years — Winslow A. Ward, American Cyanamid Co., Robert N. Boucher, Durite Division, Borden Co., and Mr. GeWertz; and three years—Saul Blitz, Noma Electric Corp., Russell H. Skidmore, Celanese Corp. of America, and Arthur M. Merrill, "India Rubber World."

Mr. Baron also announced the appointment of the following committee chairmen: program, Harold Schwartz, Empire Brushes, Inc.; membership, Mr. Skidmore; house, William Lewi, Dusal Tool & Mold Co.; credentials, Mr. Boucher; favors and prizes, Mr. Stott; and publicity, Mr. Merrill. A sad note in the meeting was the observance of a minute of silence in memory of Hilbert Wachtel, who died suddenly on February 20. Mr. Wachtel had been one of the original members of the New York Section and a member of the panel of experts, but had recently transferred to the Connecticut Section after starting his own company, Industrial Plastics Co., in New Haven.

Reports were also heard from the various committee chairmen. Of particular interest was the announcement by Mr. Skidmore that, as of December 21, 1950, the Section had 147 members and ranked fourth in size in the Society. It was noted that the Section showed the greatest increase in membership during the past year of all the sections in the Society.

Continuing its expansion in size, the following new members have been approved by the board of directors:

(1) Lawrence Brandt, development engineer, Barclay Mfg. Co.

(2) Marvin W. Davis, chief engineer, Dusal Tool & Mold Co.

(3) Morton R. French, vice president, Commercial Plastics & Supply Corp.

(4) Arthur E. Herman, president, Commercial Plastics & Supply Corp.

(5) Dale G. Higgins, plastics engineer, John Waldron Corp.

(6) Nicholas Klein, vice president and sales manager, Whyte Mfg. Co., Inc.

(7) Alexander Ross, president, Novo-Plas Mfg. Co., Inc.

(8) Walter J. Salmons, president, Dusal Tool & Mold Co.

(9) George J. Zador, sales representative, H. Muehlstein & Co.

Two other additions to the Section, recent transfers from the Newark Section, are William Lewi, treasurer, Dusal Tool & Mold Co.; and Frederick Lamy, consultant. Of interest as a possible future member is Elliot Albert Blitz, son of Saul Blitz, who was born on January 25.

Door prizes were contributed by Monsanto Chemical Co. through David Guarnaccia, and the meeting concluded with a drawing for two door prizes contributed by the Section.

On March 14, the New York Section will be guests of the Newark Section at a joint dinner meeting to be held at the Military Park Hotel, Newark. Principal speaker will be W. de Camp Crater, Naugatuck Chemical Division, United States Rubber Co., who will talk on "Properties and Uses of Marvinol, Kralastic, and Enrup."

Miami Valley Officers

Left to right: Martin Kasch, Pres.; Byron Nelson, Vice President; Carl Weber, Secretary; Charles Selz, Treasurer.

TEFLON TOPIC AT MIAMI VALLEY

By JOHN L. RUSSELL

"Teflon," its fabrication and its unusual properties, was the feature topic of the March 1st meeting of Miami Valley Section held at the Peerless Pantry in Miamisburg, O. This was a dinner meeting with Carroll Jensen as Program Chairman and Merle Nelson as Fellowship Chairman. Martin Kasch, Miami Valley President presided.

Mr. David D. James, Product Specialist in the Field Service Laboratory of the DuPont Co., Polychemicals Dept., Arlington, N. J., was the principal speaker. He has specialized in the extrusion of Nylon, Polythene and Lucite as well as in the molding and extrusion of Teflon. Mr. James told of some of the new fields open to Teflon and emphasized its three outstanding properties: 1) its extreme chemical resistance; 2) its fine electrical properties; and 3) its non-adhesiveness. Also stressed by the speaker was the necessity of extreme care in the processing and fabrication of this material by either molding or extrusion.

After the formal talk, Tom Scott, Kurz-Kasch, Inc. led the discussion period questions and remarks. National Secretary Walter Oelman made a report to the membership as did Byron Nelson, Vice-President and Professional Activities National Sub-Committee Chairman.

On April 5, Miami Valley Section will present a program originally scheduled for February 1 and postponed due to heavy snow and the severe winter weather. Consequently, Mr. A. R. (Ren) Morse, Injection Molders Supply Co. will speak on "Production Aids for the Injection Molders." The meeting site will be in the Cincinnati area with the exact location to be announced later by Program Chairman Ralph Backscheider.

OFFICERS ELECTED AT SOUTH TEXAS

By A. F. FUKAL

Twenty-five members and guests had dinner at Guy Francis Restaurant. After dinner our President Mr. Fukal called a Board of Directors meeting for February 23, 1951, then introduced Guest Speaker, Mr. Erwin R. Stone of the Southwest Research Institute of San Antonio. Mr. Stone told the group about the operations of the Institute and then answered questions. Mr. Fukal announced that our next meeting will be a social one and asked for volunteer entertainment.

South Texas met at the Sam Houston Steak House January 23. After dinner past President Mr. Shepphard (1950) introduced new President Mr. Alfred F. Fukal (1951) who thanked the members for electing him. He also asked for a renewed membership drive by all members and pledged his whole hearted support to the society. Mr. Shepphard then introduced Vice President Mr. L. D. Blackwell and Secretary and Treasurer Phil Shay. Mr. W. Barnes was called upon by Mr. Shepphard to give the group a summary of the financial condition of the South Texas Chapter, after which he turned over all records to Phil Shay. Mr. Shepphard then suggested that we adjourn to meet in a group at the Music hall for a program arranged by the Houston Lighting & Power Company.

Klippings From Kozy

By WALTER KOSY

The January meeting of the Detroit Section of the SPE was held on January 26 at the Rackham Memorial Building. Entertainment in the form of lovely Wyn Ellen and her accordion was presented during the dinner session from six to eight o'clock.

Speaker of the evening was Mr. Wayne Schrag, Director of Research for Gering Produtcs, Inc., of Kenilworth, New Jersey. He gave a very enlightening talk on a timely subject, "The Dry-Coloring of Polystyrene Molding Powder." Following his talk a movie entitled, "The Wonderland of Vision" was shown.

The next meeting of the Detroit group is planned for March 23, when Frank Donahue of the Monsanto Chemical Company will visit us to talk on thermosetting plastics.

Oscar L. Olson, general manager of the plastics division of the Swedish Crucible Steel Co. has been elected to succeed his father, Nels L. Olsen, as president and general manager of the Swedish Crucible Steel Co. in Hamtramck, Michigan. The new president started with the company in 1936 as assistant chemist, transferred to the sales department shortly afterward and became sales manager in 1938. He was made general manager of the plastics division in 1942.

News comes to us, rather belatedly, that Roy Lyon who was formerly associated with firm of Charles H. Frantz, Consultant, has set up his own company at 22087 Michigan Ave., in Dearborn, Michigan. Called the Lyon Design Company, the firm specializes in the design of plastic molds and die-casting dies.

Gordon B. Thayer, mold design specialist with the Dow Chemical Co., Midland, Michigan, has been appointed a member of the five-man executive committee of the rubber and plastics division of the American Society of Mechanical Engineers.

The **St. Louis Section** met on February 27 to hear Col. J. D. Childs, Deputy District Chief, St. Louis Ordnance District, discuss "Current Ordnance Procurment" and Mr. George Brumbach, The Carpenter Steel Co., Reading, Pa., discuss "Mold Steel".

TECHNIQUE OF FORMING LOW-PRESSURE POLYESTER LAMINATES IS TOPIC AT W.N.E.

By WESLEY S. LARSON

The program at the meeting of the Western New England Chapter of the SPE on February 7 covered the use of polyester resins and Fiberglas in low pressure molding and laminating. Dr. Jack Robinson of the American Cyanamid Company spoke on the use of resins and William F. Condon, Eastern Technical Representative of Owens Corning spoke on the use of Fiberglas and showed a short moving picture devoted to its use in molding. In Dr. Robinson's talk, the earliest applications of low pressure laminates were cited as wing liner board and Doron armor. When war contracts were cancelled in November, 1946, the many military applications of low pressure laminates ceased and no civilian markets were apparent. Business since then has grown slowly but surely. The outstanding difference of the polyester resins is that the cure is by polymerization and it evolves no by-products. This feature, coupled with low viscosity, allows low pressure molding and contact laminating. In this field, 300 psi is generally regarded as the top pressure.

Glass is the recommended filler for moldings and laminates. The polyester-glass combination has high impact resistance and is resilient as demonstrated by its use in boats. The material is also corrosion and chemical resistant and such applications as washing machine liners are proper. Other applications are in decorative and lighting panels, outdoor signs, electrical insulations and housings, and tubing and pipes. Casting resins have not been as successful as was hoped for although some potting is done. A wide range of resin properties is available. The viscosity may range from 1800 poises to 3 poises and a crystalline resin is also available. Self-extinguishing resins and flexible resins are available and can be blended with standard resins to any degree. In the curing process a gel forms and the reaction is exothermic and will proceed to ultimate cure. The resins cannot be over cured within reasonable times or temperatures. An example of the degree of exothermic reaction is the fact that an 8 gram resin sample cured in an 80°C water bath will develop a temperature of 245°C. Benzoyl peroxide is generally used (usually in paste form) for cures at 100 to 150°C. Lupersol DDM is frequently used for room temperature curing; the pot life can be varied from 1 to 24 hours by adjusting the concentration of catalyst.

In forming polyester-glass parts, the lay-up of the laminate may be by simple contact or by pressure on a rubber blanket. A new and controversial method of molding is the "suck up" or vacuum impregnation. Matched metal molds make the best parts and the resin is generally poured into the mold and forced throughout the preform by the pressure of the plunger. These matched metal molds are usually not as rugged as molds for phenolics, but should have good mass to absorb the fluctuations of heat. The plunger should be "telescopic" so that it can follow through to compensate for the shrinkage of the molded part. Glass reinforced molding compounds are being used; the material flows readily even into large thin webs and can be easily transfer molded. A part weighing 23 pounds is now being made.

Mr. Condon spoke about the making of glass filaments and fibers beginning with the glass marbel from which 94 miles of filament can be drawn. Various filament sizes are made for the different applications. Mr. Condon then showed a short film illustrating the use of glass fiber in a hot forming machine in which the preform is shaped by vacuum felting. These machines are now being successfully used. A recently introduced unit which supplies chopped fibers directly from glass roving was described and samples of the roving were shown. Mr. Condon showed a large display of molded and laminated samples which were extremely effective in illustrating the progress which has been made in the consumer goods field.

In the question period which followed the talks of Dr. Robinson and Mr. Condon, the following points were brought out. Wetting of glass fibers is a problem; the best method seems to be to flush the liquid resin through the fibers thus removing the air ahead of the rest. In molding, the gelled shape must be continually under pressure to compensate for the shrinkage, which is 3 to 5%. A rule of thumb figure for glass mat moldings is $1.00 per pound as the selling price. The average specific gravity is 1.6. Where two unevenly heated mold surfaces are used, the hot surface makes the better finish.

The last meeting of the Western New England Chapter of the SPE was held at the Sheraton Hotel in Springfield, Mass., on February 7. The meeting was well attended by approximately 65 members and guests. The door prize of the evening was won by Sam Gagnon of the Gagnon Mold Company of Florence, Mass.

George Scott in the Beetle Polyester-glass boat he won at Western New England's February meeting.

Section Notes

The Central Ohio Section met in Zanesville on February 16 to hear Paul Andrus of Battelle Memorial Insititute give an illustrated demonstration of Xerography. This is a new method of photography in which there is no chemical reaction, the process being completely physical. It is now used commercially as a very rapid means of photocopying.

The Plaskon Division's new "Mobile Molding Unit" was on display at the Erie Resistor Co. on March 6th. A special invitation to the **Northwestern Pennsylvania Section** to visit the unit was issued. On March 8th the Section heard E. S. Childs, Monsanto Chemical Co., discuss "Plastics in Defense". Mr. Child covered the government's progress in development of new applications for plastics since World War II; types of items for which the government is spending money; and trends of government orders over materials and products.

MILITARY APPLICATIONS AND MOLD STEELS ARE NEWARK TOPICS

By ANTHONY NATURALE

On February 14, our regular meeting was held at the Newark Athletic Club.

The first speaker, Mr. J. L. Morrison, Vice President of Detroit Mold Engineering Company, gave a very interesting talk on mold polishing. Mr. Morrison pointed out that a lot of the trouble reported as poor steel can be traced to poor polish. The discussion that followed was both interesting and informative. It was brought to a close when Mr. Roland Frackenpohl of Newark Die Company pointed out that there were no definite standards by which the plastic mold making industry could measure the amount of polish necessary to do a good job. He mentioned that what might satisfy one molder could be considered an awful job by another molder. At this point, our National President, Mr. Islyn Thomas, explained to the members that setting standards was one of the jobs for the SPE. Standards of mold polish would be a good project for the Society of Plastic Engineers to work on.

The second speaker, our program chairman, Mr. Jack Pectal, made arrangements with Mr. Charles N. Gardner from the Office of Quartermaster General, Washington, D. C. Mr. Gardner's subject, "Military Application of Plastics," was both timely and interesting. The discussion that followed brought many questions pertaining to procurement, negotiated bids, and specifications.

On the above subjects, several members gave us their experiences and recommendations for obtaining government orders.

The questions on specifications were clearly answered by our speaker, Mr. Gardner, who pointed out that until the government has faster methods of testing and proving specifications on any item, it will be very hard for anyone to expect quick changes on specifications.

He made it clear that all of the men setting up government specifications would be most interested in reviewing and answering questions on the specifications desired.

The following new members were announced at our Director's meeting held February 7, 1951.

Alfred S. Backus, Mycalex Corporation; Joseph N. Caruso, Atlantic Tool and Die Company; Harry E. Pebley, Jr., Picatinny Arsenal.

The Newark Section was honored by having one of their charter members, Mr. A. J. Warner appointed to represent SPE on the subcommittee to supervise participation by American Industry and Technology in the work of Committee 61 on Plastics of the International Organization for Standardization. Congratulations to Art Warner!

QUEBEC TALKS ON RIGID VINYLS

By E. PETER HERSEY and E. SUTER

Keeping abreast of the times is one of the more important factors in the equation of business success.

It was the good fortune of the Quebec Section to have Mr. George Flanagan of the B. F. Goodrich Chemical Co., Cleveland, Ohio as speaker for the February 22nd meeting. Mr. Flanagan delivered one of the more unusual and definitely stimulating papers that was originally presented at the Seventh Annual Technical Conference of the SPE in New York last January. The subject was "Properties, Applications and Processing of a New Rigid Vinyl Resin."

Unique among rigid plastic materials this recently introduced product offers tremendous possibilities in a wide variety of fields. These include injection molding, deep drawing and vacuum forming into rigid products, extrusion, and applications where the definitely superior electrical, impact, abrasion and flexural strength properties of this new product may be used to advantage.

In addition to Mr. Flanagan's lecture the meeting included a sound color film entitled "An Exact Duplicate". This film produced by the George Gorton Machine Co., Racine, Wisc., introduces the latest engineering technique in "Tracer Control". Highlights from the film include pantograph engraving, contour grinding, die and hob making, etc.

The third profit feature of the February meeting was the informal social and dinner hour which was in the accommodating and very comfortable Venus De Milo Room of the Venus Restaurant.

The January meeting of the Quebec Section took place in Montreal on January 31st, 1951 at the C. I. L. Theatre.

Before the meeting, the members and their friends had an informal get-together at a dinner in the Jamaica Club which proved to be a complete success.

The meeting started at 8:30 P.M. with the showing of a Colour Film entitled "ROBOTS AT WORK." This film is of particular interest to compression molders.

Following the film, the meeting had the pleasure of hearing from the guest speaker, Mr. M. A. Nichols, President of Manco Products Company of Melvindale and an authority on beryllium copper.

In his lecture, he outlined the origin of beryllium copper and its use, particularly in the mold making industry. It was gratifying to see the interest the meeting displayed, and Mr. Nichols substantiated his facts with samples and pictures and answered the innumerable questions precisely and interestingly.

Mr. R. G. Rea introduced, and Mr. Peter Hersey thanked the speaker.

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Your SPE

(Continued from page 12)

cers and the transaction of SPE business.

The Annual Meeting follows a luncheon, for the presentation to the SPE members of the new officers, the reading of the financial reports, and other committee reports. Members present may bring new business to the floor for consideration, and vote on constitutional matters.

In recent years a special program for ladies has been an attractive feature for the wives of the attending members.

This annual event is the high-spot of the national activities, and the excellence of the technical sessions has made them increasingly important for the plastics business. Although the Technical Conference is a national activity, the actual work involved is carried out by the members of the sponsoring section: Detroit-1945 and 1946; Chicago - 1947; Detroit - 1948; Philadelphia - 1949; Cleveland - 1950; Newark-New York-1951.

PRIZE PAPER CONTEST

The SPE sponsors annually a Prize Paper Contest, offering prizes of $200, $100, and $50 for the best technical articles submitted during the year. The articles are not restricted in length and may deal with any phase of the plastics business, such as molding procedures, mold design, product design, machine design, use or adaptation, extrusion, laminating, calendaring, coating, films, packaging, new test procedures or specifications, materials properties, chemistry, theoretical material relating properties of plastics to structure or test results, and such other topics as engineering design, personnel selection, shop financing, sales techniques, engineering education, consumer education, public relations and the like. The only restriction is that the article be pertinent to some phase of the plastics business. Anyone may submit a paper, whether or not a member of the SPE.

Papers are submitted to the local section, and are usually judged for section prizes, which sometimes are as large or larger than the national prizes. The first prize paper from each section is then entered in the national contest, and winners are urged to present their papers at the National Conference.

The purpose of the contest is to encourage the development of original thought, and to provide to the members an opportunity for recognition. The contest offers a real chance especially for the younger members and those seeking advancement. Prize papers are usually printed in the SPE JOURNAL.

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(Continued from page 19)

domes, and a wide variety of specialized items."

Other Army and Navy items now in demand or likely to be in demand and made from plastic include buttons, canteen caps, spoons, tablewear, sun helmets, tent windows, whistles, combs, decoration containers, firemen's helmets, machete sheaths, soap box and food tray liners. Currently being studied as to the possibilities, Gardner said, are clear, transparent tumblers, polyethylene snow rings and hand grips for ski poles. Shoe heels, fibrous filled thermosetting replacements for tent hardware, phenolic buckles and styrene cap visors.

On January 15, the Cleveland-Akron Section of The Society of Plastic Engineers held its annual election of officers, and for 1951 chose Wayne F. Anderson of B. F. Goodrich Chemical Company as its President.

Other officers for the current year are: Vice President—Frank A. Martin (The Hoover Company, North Canton, Ohio); Secretary—David J. Sloane (Lester Engineering Co., Cleveland); Treasurer—Bernard Wulf (Plastic Engineering, Inc., Cleveland) and National Director — George E. Field (B. F. Goodrich Chemical Company).

Additions to the Board of Directors for 1951 are Dr. Hugh Winn (Firestone Tire & Rubber Co., Akron, Ohio); Stephen Hiltebrant (General Industries Co., Elyria, Ohio); Bernard Wulf and Frank Martin.

UPPER MIDWEST

By D. H. Chambers

The **Upper Midwest Section** met on February 12 to hear A. R. Morse of Injection Molders Supply Co., discuss "New Production Tools for the Injection Molder" and to see three outdoor movies. Committees for the year have been appointed as follows: Finance — William Mahle; Membership — A. G. Morrison; Credentials — Fulton Holtby; Professional Activities —D. R. Williams; Program—J. Formo; House — A. G. Bezart; Publicity —D. H. Chambers; Education — L. Erickson; Bulletin editor — D. H. Chambers. At the previous meeting, "Electroplating of Plastics" was discussed by Jerome Weller of Brown & Bigelow. Although several processes for preparing surfaces of thermoplastics prior to plating are available, such as graphite type lacquers, they are not as satisfactory as the process recommended. Best resu'ts are obtained by first a light sand blast to etch the surface, then a sensitizing dip in stannous chloride, followed by a flash plating of silver to obtain conductivity. The remaining step is the plating of the metal desired. Where a single surface is to be plated, it is advisable to keep thickness of final plate to less than one-half thousands of an inch to eliminate peeling. Heavier coatings of several thousands may be used if the plating envelopes the entire surface of the piece. Highly polished surfaces are obtained by tumbling with commercial compounds.

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